Management of business process design in global implementation of enterprise resource planning systems

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MANAGEMENT OF BUSINESS PROCESS DESIGN IN GLOBAL IMPLEMENTATION OF ENTERPRISE RESOURCE PLANNING SYSTEMS

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ABSTRACT

Investments in global enterprise resource planning (ERP) systems are typically carried out as a part of the globalization process in multinational corporations (MNCs). Global ERP systems support integration and control in MNCs in an important way by establishing a common language across an MNC. As process and data standardization are among the primary drivers of ERP consolidation efforts, business process design is an important concern when implementing global ERP systems. This PhD study addresses three research questions that develop understanding, support, and improvement of the practice of business process design in the course of a global ERP implementation in MNCs. In light of existing theoretical and practical challenges, the research questions focus on three business process management (BPM) capabilities: alignment, governance, and method. Drawing on extensive literature reviews and findings from case studies in nine organizations, the study addresses the three prescriptive research questions through five descriptive studies.

First, by deploying alternative theories, this study explores the strategic, institutional, organizational, and relational factors that influence business process design, and particularly process standardization, in an MNC. Second, the study investigates implications of process standardization for the choice of ERP architecture in MNCs. The findings indicate the moderating impact of process standardization on a global ERP system's total cost of ownership and its support for control and coordination. Third, having identified the factors that influence process standardization in MNCs, the study investigates the alignment between process standardization and an MNC's international management strategy and indicates that process standardization as a centralizing coordination mechanism better fits MNCs structured for global integration compared to those seeking local responsiveness. The study develops conditions of fit between structural elements characterizing an MNC's international management strategy and process standardization. Fourth, seeking governance mechanisms enabling business process design, the study explores collaborations between BPM and IT management functions and suggests the need for horizontal integration between the two functions in support of business–IT alignment. In addition, the study associates the direction of integration with the role of IT. Fifth, in search of a method enabling integrated business process design, the study investigates diverse views on enterprise architecture (EA) and various applications of enterprise architecture management (EAM) in organizations. The findings are classified as a taxonomy of EAM applications in organizations based on EA scope.

Drawing on findings from descriptive studies, the PhD study clarifies the criticality of business process design in the course of a global ERP implementation by explaining the impact of strategic, institutional, organizational, and relational contexts on process standardization on the one hand, and the importance of process standardization for reducing ERP total cost of ownership and its deployment as an integrative mechanism on the other. The study concludes that business process design in the course of a global ERP implementation can be supported by aligning decision making on process standardization with corporate international management strategy and structural characteristics. Furthermore, business process design can be supported by establishing permanent central governance for BPM and horizontally integrating the BPM function with the IT function at the strategic and operational levels. Business process design in the course of a global ERP implementation can be improved by adopting EAM as a methodology that enables integrated design of business processes and IT systems in alignment with business strategy.

RESUMÉ

Investering i globale ERP-systemer – Enterprise Resource Planning systemer – foretages typisk som et led i en globaliseringsproces i multinationale selskaber (MNC'r). Globale ERP-systemer understøtter integration og styrring i multinationale selskaber, idet de bruges til at etablere et fælles sprog på tværs af selskaberne. Da proces- og datastandardisering er blandt de primære drivkræfter i ERP-konsolideringsanstrengelserne, bliver forretningsproces-designet et vigtigt område, når der skal implementeres globale ERP-systemer. Denne ph.d.-afhandling omhandler tre forskningsspørgsmål for at give en forståelse for og understøtte og forbedre praksis inden for forretningsproces-design i forløbet med at implementere globale ERP-systemer i multinationale selskaber. I lyset af eksisterende teoretiske og praktiske udfordringer fokuserer forskningsspørgsmålene på tre kapabiliteter af ledelse af forretningsprocesser (Business Process Management - BPM): afstemning, styring og metode. Ph.d.-afhandlingen behandler de tre forskningsområder gennem fem beskrivende studier. De beskrivende studier er baseret på omfattende litteraturgennemgang og case studier i ni forskellige organisationer.

Ved at trække på resultaterne fra de beskrivende studier belyser ph.d.-afhandlingen først de kritiske forhold ved et forretningsproces-design under implementering af globale ERP-systemer ved at forklare, hvilken indvirkning det har strategisk, institutionelt, organisatorisk og relationelt set mht. standardisering af processer på den ene side og vigtigheden af standardisering af processer for at kunne reducere systemets samlede omkostninger og dets udrulning som en integration mekanisme på den anden. For det andet specificerer studiet BPM kapabiliteter for at understøtte forretningsproces-design aktiviteter i multinationale selskaber. Studiet foreslår, at forretningsproces-designet ved implementering af globale ERP-systemer kan understøttes ved at afstemme beslutningen om proces-standardisering med koncernens internationale ledelsesstrategi og strukturelle karakteristika. Ligeledes udvikler studiet betingelser for egnethed mellem strukturelle elementer, der karakteriserer et multinationalt selskabs strategi og processtandardisering. Endvidere foreslår studiet, at forretningsproces-designet kan understøttes ved at etablere en central permanent styring for BPM og horisontal integration af BPM- funktionen med IT-funktionen på strategisk og operationelt plan. Det relaterer også integration med den rolle, som IT spiller i organisationen. For det tredje undersøger studiet de metodiske kapabiliteter af BPM, der forbedrer praksis for forretningsproces-design ved implementering af et globalt ERP system. Efter udvikling af en taksonomi for "Enterprise Architecture Management"- applikationer (EAM), foreslår studiet EAM som metodologi til forbedring af forretningsproces-design aktiviteter. Det argumenteres, at man ved at anvende EAM muliggør et integreret design af forretningsprocesser og IT-systemer, der er afstemt efter forretningsstrategien.

Dette ph.d.-studie udfylder nogle af manglerne i den eksisterende litteratur, der omhandler implementering af globale ERP-systemer og ledelse af forretningsprocesser i multinationale selskaber. Det gøres dels ved at klarlægge de kritiske forhold ved forretningsproces-design under implementering af et globalt ERP-system og dels ved at foreslå et sæt kapabiliteter for BPM, der understøtter og forbedrer forretningsproces-design aktiviteter.

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Fatemeh Rahimi
Farum, April 2016

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LIST OF ABBREVIATIONS AND ACRONYMS

BPG	business process governance
BPM	business process management
EA	enterprise architecture
EAM	enterprise architecture management
ERP	enterprise resource planning
IT	information technology
ITG	Information technology governance
MNC	multinational corporation

1 INTRODUCTION

This chapter introduces the subject areas of the current study. The first section describes the motivation for conducting the study. The second and third sections present the three research questions and the practical challenges that this study sets out to answer. The fourth section provides an overview of terminology used throughout the dissertation, and the fifth section provides a structural overview of this dissertation.

1.1 Motivation

Economic globalization in its simplest form, namely exchange of finished goods, dates back to the Grecian Empire. However, the rate and scope of economic globalization have intensified over the past half century in unprecedented ways (Leidner, 2010). A fluid global capital market, falling political and tariff barriers, the technological revolution in restructuring and integrating industries, and increased similarity in infrastructure, distribution channels, and marketing approaches are some of the catalysts for globalization (Karimi and Konsynski, 1991). Indeed, significant growth in the number of multinational corporations (MNCs) is an indicator of the fast pace of globalization.

Globalization is closely related to the need for integration and control (Hanseth et al., 2001). MNCs operating in global markets are at a strategic disadvantage if they are unable to control and coordinate their complex network of activities dispersed worldwide (Barlett and Ghoshal, 1999; Porter, 1987). Therefore, investments in global information technology (IT) systems are typically carried out as a part of MNCs' globalization process (Hasneth et al., 2001; Holland and Light, 1999b; Karimi et al., 1996). IT on a global scale enhances control and coordination across an MNC and permits duplication and sharing of corporate resources (Hanseth et al., 2001; Ives and Jarvenpaa, 1991). Ever-increasing global competition has especially increased the popularity of enterprise resource planning (ERP) systems among MNCs and has turned the implementation of corporate-spanning global ERP systems into an integral part of centralizing control (Carton and Adam, 2003). In the mid- to late 1990s, many large MNCs undertook ERP system implementation as one of the most ambitious information systems projects in their histories (Davenport et al., 2004). Global ERP systems support integration and control in MNCs in two important ways. First, these systems provide the technological capability for collaboration and communication across time and space (Hanseth et al., 2001). Second, global ERP systems provide a common language across MNCs by unifying business processes and data structure (Carton and Adam, 2003; Hanseth et al., 2001).

Harnessing IT, and herewith ERP systems, on a global scale presents management with far more challenging problems than those encountered in sharing systems across domestic divisions. Because global IT systems cross national boundaries they are exposed to wide variations in business environments, technological and regulatory environments, and infrastructure availability (Karimi and Konsynski, 1991). From a technical perspective, implementation of a single-instance global ERP system requires particular attention to server sizing, storage capabilities, and net-

work requirements (Koch, 2006; Madapusi and D'Souza, 2005) as well as system support for multiple languages, multiple currencies, and country-specific legal requirements (Markus et al., 2000; Zrimsk and Prior, 2003). Yet, the significant growth in ERP hardware and software and communications technology has diminished the influence of technical constraints on the implementation of global ERP systems (Ghosh, 2002; Rayner and Woods, 2011). Critical business-related difficulties, however, still remain (Davenport, 1998). ERP systems are perhaps among the most challenging systems to implement globally because of the magnitude of their impact on business processes.

Business process design is an important concern when implementing global ERP systems in MNCs. Deploying a global ERP system as a tool to facilitate control and coordination across subsidiaries requires common standards for business processes and data structure (Gattiker and Goodhue, 2004; Sethi et al., 2008). Therefore, a high level of process standardization is among the primary drivers of ERP consolidation efforts in MNCs (Clemmons and Simon, 2001). However, reaching a global consensus on shared process and data standards has proved difficult to achieve. Although Levitt (1983) believes that the days of national and regional preferences are gone and that there is a convergence in commonality, in reality business processes across MNC subsidiaries are different as a result of diversity in national culture, language, management style, politics, regulations, customs, and market requirements (Sheu et al., 2004). Process standardization efforts are also hindered by universality–individuality and efficiency–flexibility dilemmas (Huber et al., 2000). Standardization of business processes across an MNC may also be hampered by communication problems, different priorities and habits, and political conflicts (Gulla and Mollan, 1999). All these make business process design, particularly process standardization, a cumbersome task when implementing global ERP systems in MNCs.

Business process design becomes even more important when considering the emphasis of the third wave in process management concept on continuous business-process improvement. The contemporary business process management (BPM) concept suggests that change is the primary design goal (Smith and Fingar, 2003a). In contrast to business process reengineering that as a one-off activity did not support control over business processes, BPM advocates continuous optimization of an organization's business processes (Smith and Fingar, 2003a). While the increasing focus on redesigning organizations around business processes led to a large wave of ERP implementation in the 1990s (Al-Mashari, 2001; Davenport et al., 2004; Subramoniam et al., 2009), BPM suggests that realizing value from ERP systems demands continuous improvement of the ERP system and embedded business processes (Davenport et al., 2004). Therefore, business process design is no longer a one-off project that concrete casts business processes into the ERP system, but rather an ongoing activity. When deploying BPM as a management discipline, organizations require new capabilities to institutionalize the concept of continuous business process design and improvement.

Despite the growing popularity of global ERP implementation, ERP research has largely focused on intra-organizational aspects of ERP implementation (Haug et al., 2010). Little is known about how to align ERP configuration in MNCs with business requirements in individual subsidiaries and at the same time realize coordination and cooperation on a global level (Haug et al., 2010). In other words, there is insufficient knowledge as to how to design and adjust business processes within a network of organizations (Wang et al., 2010). In particular, academic and practitioner studies on process standardization are noticeably absent (Ungan, 2006). In light of existing research gaps in global ERP implementations and management of business processes in a global context, this PhD study seeks to develop an understanding of the criticality of business process design in MNCs, and elaborate on BPM capabilities that support and improve business process design in the course of a global ERP implementation.

To investigate this topic, I had the opportunity to work with GEA Process Engineering, a leading corporation in providing technology for the food and chemical processing industries. To reduce IT costs, facilitate financial reporting, and improve collaboration across subsidiaries, GEA Process Engineering decided to consolidate the ERP systems across its own subsidiaries and launched a global ERP program in 2011. The start of this PhD study coincided with the global

ERP program startup and by the time the study concluded, the program had developed a global template and completed the pilot roll-out of the system in three subsidiaries. The choice of business process design as the focal point of this PhD study was also to support GEA's program managers to meet critical challenges in business process design during development of the global template. As a member of the global ERP program team, I assisted in establishing capabilities required for managing, and in particular designing, business processes in the course of the global ERP implementation.

1.2 Research questions

The collaborative practice research approach suggested by Mathiassen (2002) guided the framing of research questions for this study. The learning cycle of collaborative practice research consists of understanding, supporting, and improving the practice under investigation. Having adopted this cycle, research questions are formulated in a way that allowed the creation of three types of knowledge: understanding, supporting, and improving the design of business processes in the course of a global ERP implementation in an MNC. Implementing the full cycle was especially important in the context of information systems research as it is an applied research discipline in which contributions not only aim at understanding practices within the field but also providing normative support for better practices (Mathiassen, 2002).

The study began with an interpretation of the problem the researcher faced in the organization. This sense-making process included applying multiple frames of reference and alternative theories to develop understanding and insight into global ERP systems and their links with an MNC's business processes. This initial stage also served to position the research and determine what to look for in the real world. Such activity was guided by the first research question:

RQ1: Why is business process design critical in the course of a global ERP implementation?

Next, the study intended to contribute new knowledge that could support the practice of business process design in the course of a global ERP implementation. This knowledge comprises normative propositions concerning BPM capabilities that support the practice. This activity was directed by the second research question:

RQ2: How can we support business process design in the course of a global ERP implementation?

Once knowledge of the capabilities required to support business process design in global ERP implementations was partially used and enacted in the organization, the study focus shifted to learning about BPM capabilities that could improve the practice. This activity was guided by the third research question:

RQ3: How can we improve business process design in the course of a global ERP implementation?

Although the three research questions cover the full cycle of collaborative practice research, they are broad in scope. I used specific practical challenges faced at the sponsoring organization as guidelines to narrow the scope of research questions and identify BPM capability areas for investigation. The next section describes the major practical challenges that narrowed the focus of this PhD study.

1.3 Practical challenges

During the summer of 2010, the GEA Group board announced that all companies (approximately 400) in GEA Group were to replace their ERP solutions with a single-instance global SAP ERP system before 2020 along with financial structure standardization. The principal motivation behind this decision was to improve business transparency and financial reporting. Within the GEA Process Engineering division (referred to as GEA hereafter), GEA Process Engineering A/S — acting as division headquarters — was appointed to manage implementation of the global

ERP system in about 60 subsidiaries. However, strongly believing that a solely technical consolidation could not be financially justified, the central IT function in GEA aimed at enabling a wider range of business consolidation benefits by pursuing a higher level of process and data standardization. In 2011, when the global ERP program was kicked off in the division, GEA could foresee several challenges with managing design of business processes in the global context.

First, GEA faced the well-known question of how much uniformity should exist in the way it did business in different subsidiaries (Davenport, 2005). Process standardization is encouraged across organizations that are operationally similar and generate the same outputs (Harmon, 2007; Ross et al., 2006; Tregear, 2010). All GEA subsidiaries were engaged in designing highly engineered components and plants, and thus their operational comparability served as the main motive for process standardization; yet, they varied in size and end products that could impose limitations on process standardization. Process standardization also represented a daunting challenge as the subsidiaries were scattered across different regions and countries and thus represented diverse cultural values and legal obligations in their business processes. More importantly, process standardization was perceived as a potential threat to subsidiaries' strategic and operational autonomy. The challenge then was to implement the level of process standardization that would meet corporate-level objectives for efficiency, transparency, and integration, without hampering the competitiveness of individual subsidiaries.

GEA was also challenged with deciding whether business processes should be redesigned according to ERP best practices. Enacting ERP-embedded processes induces isomorphism, which may result in erosion or even disappearance of the distinctive characteristics of an organization (Batenburg et al., 2008). This is especially a problem when business processes represent a unique source of competitive advantage (Akkermans et al., 2003). Understandably, this issue manifests itself more strongly in engineering organizations where business processes support the creative design of one-of-a-kind products. Consequently, the first practical challenge had an alignment nature, where GEA was seeking conditions of fit between its contingencies and business process design, and particularly process standardization in the course of the global ERP implementation.

- What contingency factors are decisive for business process design in the course of a global ERP implementation? How should process standardization be aligned with corporate contingencies?

Second, GEA faced the question of how process standards should be developed and how compliance should be managed (Tregear, 2010). GEA realized that the global ERP implementation would require new managerial responsibilities to reconcile the tension between process standardization and localization and to manage the dilemma between ERP adjustment and business process adaptation. However, being structured as a decentralized MNC, governance mechanisms for BPM were missing at the corporate level and each subsidiary was responsible for managing its own business processes. Therefore, GEA aimed for establishing a new governance structure to manage business process design in the course of global ERP implementation. To maintain GEA competitive advantages and critical local differences, the governance structure had to allow for balancing global and local requirements when designing new business processes. Therefore, the second practical challenge concerned establishing governance capabilities that could support business process design in the course of the global ERP implementation.

- What governance mechanisms enable business process design in the course of a global ERP implementation?

Third, after establishing the governance structure for business process design, GEA needed methods that could facilitate consistent design of business processes in alignment with corporate business strategy. The top-down approach for business process design was especially important as the global ERP program faced reluctance by the BPM governance board to make decisions about common process and data standards. In addition, the global ERP program was accompanied by other IT implementation projects that shared interfaces with the ERP system. This situation demanded a method that could facilitate business process and IT system design per-

taining to the scope and boundaries of the various IT systems. Business process modeling methods with their process-centric view could not support integrated design of business processes in alignment with business strategy and IT systems. Therefore, the third practical challenge concerned developing methodological capabilities that could facilitate integrated design of business processes in the course of the global ERP implementation.

- Which methods promote consistent and integrated business process design in the course of a global ERP implementation?

	Practical challenges	RQ1: Why is business process design critical in the course of a global ERP implementation?	RQ2: How can we support business process design in the course of a global ERP implementation?	RQ3: How can we improve business process design in the course of a global ERP implementation?
Alignment	What contingency factors are decisive for business process design in the course of a global ERP implementation?	X	X	
Governance	What governance mechanisms enable business process design in the course of a global ERP implementation?		X	
Method	Which methods promote consistent and integrated business process design in the course of a global ERP implementation?			X

Table 1-1: Research questions in relation to practical challenges

The practical challenges defined areas of focus for investigating the research questions of this PhD study. Table 1-1 presents how each research question addresses the various practical challenges. In line with the engaged nature of this PhD study, the practical challenges constraining the research questions were formulated in close collaboration with IT managers responsible for GEA's global ERP implementation. IT managers' concerns were placed in the foreground to ensure that the research not only contributed to filling theoretical gaps but was also grounded in reality as it addressed critical aspects of business process design in the sponsoring organization.

1.4 Terms and definitions

As a critical realist, I believe in the crucial role of meanings. To establish a common understanding of terms, Table 1-2 provides an overview of the terminology used throughout this dissertation.

Term	Definition
Business process management (BPM)	BPM is a structured management approach that employs methods, policies, metrics, management practices, and software tools to coordinate and continuously optimize an organization's activities and processes for efficient and effective delivery of business objectives (Davis and Brabänder, 2007).
Business process design	Business process design, business process implementation, business process execution, and business process monitoring and control are the four phases of the business process life cycle. In the business process design phase, the business processes are specified in detail. Business strategy sets the guidelines for business process design. Business process specifications drive the business process implementation and execution phases (Kirchmer, 2010).
Business process standardization	Process standardization means the development of a standard or best-practice process to be used as a template for all instances of the process throughout the organization (Tregear, 2010).
Business process management capability	BPM capability areas must be addressed for successful BPM. These areas include alignment, governance, method, IT, people, and culture. These factors are used to assess an organization's BPM maturity (Rosemann and vom Brocke, 2010).
Business process governance (BPG)	BPG represents the overarching guidelines for administration and application of BPM (Kirchmer, 2011). BPG establishes relevant and transparent process roles and responsibilities and process management decision-making to guide desirable process actions (Doebeli et al., 2011).
IT governance (ITG)	ITG is the framework for distribution of decision-making rights among stakeholders and the procedures and mechanisms for making and monitoring IT decisions (Peterson, 2004). The purpose of ITG is to encourage desirable behavior in the use of IT (Weill and Ross, 2004) and to ensure that an organization's IT sustains and extends the organization's strategies (ITGI, 2003).
Business process management alignment	Strategic alignment is defined as the tight linkage of organizational priorities and enterprise processes. Processes have to be designed, executed, managed, and measured according to strategic priorities and specific process capabilities that inform strategy design (Rosemann and vom Brocke, 2010). Operational alignment is concerned with building technological, human, and infrastructural resources based on business process specifications (Burlton, 2010).
Business process management method	Methods comprise the set of tools and techniques that support and enable activities along the process life cycle and within enterprise-wide BPM initiatives (Rosemann and vom Brocke, 2010).
Multinational corporation (MNC)	Companies with operations and market interests beyond the geographical boundaries of their home countries (Szabat and Tavana, 2010).
International management strategy	Based on the relative importance of global efficiency and local responsiveness, the MNCs are categorized as global, international, multinational, and transnational organizations. An MNC's international management strategy is devised along two structural dimensions: configuration of assets and headquarters–subsidiary relationships (Bartlett and Ghoshal, 1999).

Term	Definition
Enterprise resource planning (ERP)	ERP systems are comprehensive, packaged-software solutions that seek to integrate the complete range of business processes and functions of an organization. In its most comprehensive form, the software is generic, targets a range of industries, and must be configured before it can be used. Packaged, pre-configured templates, tailored towards specific industry sectors or companies of a certain size, have been derived from the comprehensive software (Klaus et al., 2000).
ERP architecture	MNCs are provided with several architectural choices for global ERP solutions. At one end is completely decentralized architecture, where the global ERP solution is distributed on several systems that work separately and independently and each has its own database. On the other end is centralized architecture that consists of a single system on which all corporate applications and data are implemented on a single database. In its most extreme form a centralized system is configured as a single-client system as opposed to centralized systems comprising multiple clients. Although in a multi-client system the clients share the same system and hardware resources, the presence of multiple clients supports data separation and client-dependent configurations. A decentralized architecture with shared services can be considered a hybrid of centralized and decentralized architectures, in which shared service systems are the lead systems to which the subordinate decentralized systems are connected (Davidenkoff and Werner, 2008).
Enterprise architecture (EA)	EA is the fundamental conception of the enterprise in its environment embodied in its elements, their relationships to each other and to its environment, and the principles guiding its design and evolution.
Enterprise architecture management (EAM)	EAM is a management approach that supports understanding, planning, developing, and controlling enterprise architecture in a coordinated and purposeful manner by providing a holistic understanding of the EA and ensuring adherence to EA principles and standards (Buckl et al., 2010; Lux et al., 2010; Radeke, 2010).

Table 1-2: Terms and definitions

1.5 Structure of the thesis

The thesis comprises this summary and five papers. Chapter 1 presented the motivation and research objectives of this PhD study. Chapter 2 presents a review of earlier studies on areas of interest and identifies theoretical gaps in addressing practical challenges. Chapter 3 discusses the research design of the study. It describes philosophical assumptions grounded in critical realism and implications for research methodology, that is, case studies. The chapter also elaborates on the research process and validity of conducted studies. Chapter 4 provides a summary of the five publications and relates them to the research questions and theoretical areas of concern. Chapter 5 presents answers to the research questions posed by this thesis and discusses its contributions to practical and theoretical challenges. Furthermore it discusses the study's limitations and suggests directions for future research.

1.6 Chapter summary

In this introductory chapter, objectives for the study were clarified by elaborating on the importance of global ERP systems for globalization efforts in MNCs and the importance of business process design for value realization from ERP systems and their deployment as a tool to facilitate control and coordination across subsidiaries. Next, drawing on the collaborative practice research approach, three research questions guiding the study were presented. The research

questions were framed in such a way as to generate three types of knowledge: understanding, supporting, and improving the design of business processes in the course of a global ERP implementation in MNCs. Third, the scope of the research questions was narrowed based on practical challenges faced in the course of global ERP implementation in the sponsoring organization. Practical challenges called for BPM capabilities in alignment, governance, and method, as the focal points of this study. Fourth, to establish a common understanding, an overview of the terminology used throughout the dissertation was provided. The chapter concluded with an overview of the study's structure.

2 THEORETICAL FRAMING

This chapter opens with a discussion on the importance of BPM for ERP implementations, and presents earlier research on BPM capabilities for enabling management of business processes, particularly business process design, in organizations. Literature review topics cover ways and means of addressing the practical challenges mentioned in section 1.3. The chapter serves to position this PhD study via identifying theoretical challenges in relation to business process design. Hence, the chapter is not a summary of literature reviews conducted in the course of the study. A summary of the literature reviews for each of the studies can be found in chapter 4 and are further elaborated in the papers included in the appendices.

2.1 BPM in relation to ERP implementation

The increasing focus on redesigning organizations around business processes has caused a significant paradigm shift in the way IT is developed and used to support business operations (Al-Mashari, 2001). The demand for process-oriented IT platforms gave rise to the development of ERP systems which essentially provided seamless integration across the various functional areas of an organization (Al-Mashari, 2001; Subramoniam et al., 2009). Indeed, it was the concept of business process reengineering that led to the large wave of ERP implementations in the 1990s (Davenport et al., 2004). ERP system implementation also often triggers BPM initiatives (Al-Mashari, 2001; Scheer and Brabänder, 2010). The field of ERP has long been investigated as part of BPM studies. As illustrated in Figure 2-1, between 2004 and 2015 about 12% of all papers published in the *Business Process Management Journal* discuss ERP systems.

As IT systems play an important role in enabling effective business processes, some studies choose to define BPM as the ability of an organization to integrate, build, and reconfigure the most often IT-enabled business processes of an organization (e.g., Niehaves et al., 2012). Several studies suggest that ERP implementation is not merely a software implementation or IT project, but rather to ensure successful ERP implementation and operation, organizations must manage ERP implementation as a program of wide-ranging organizational change (Al-Mashari, 2001; Davenport et al., 2004), and particularly pay sufficient attention to BPM (e.g., Al-Mudimigh, 2007). Nah et al. (2001) argue that business process reengineering should be performed well before implementing an ERP system, and even before choosing the system. Earlier studies enumerate several ways in which BPM, as a basis for business change, supports ERP implementation in organizations.

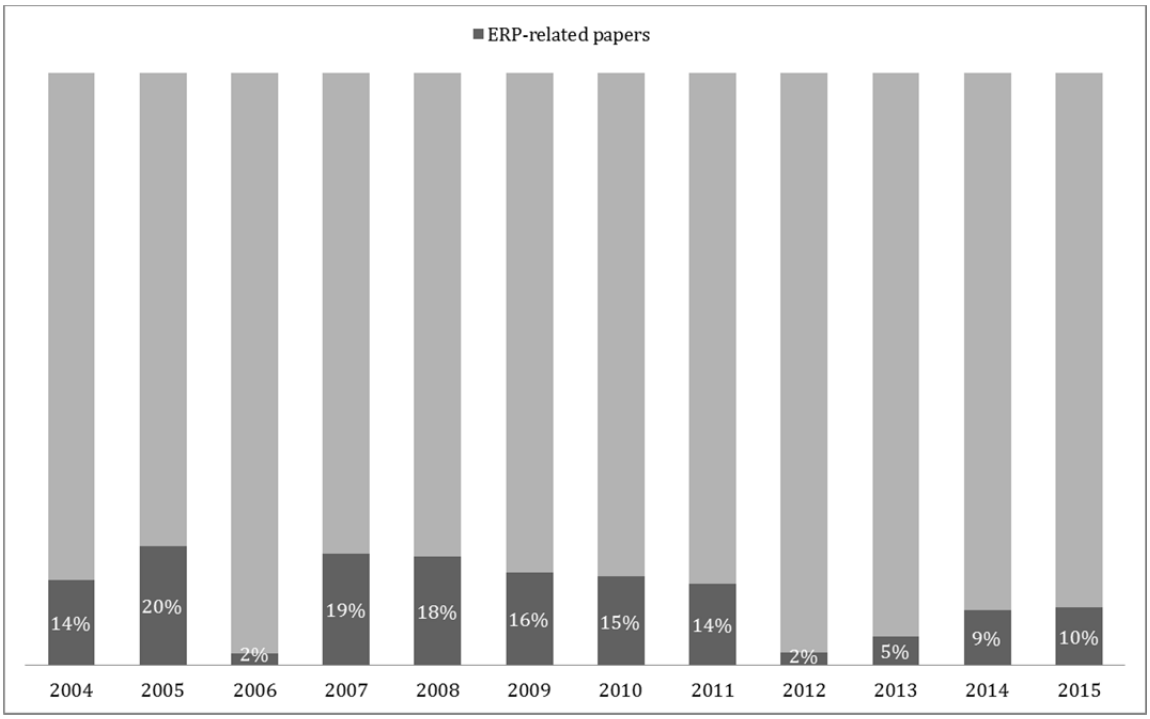

Figure 2-1: ERP-related papers published in *Business Process Management Journal* in 2004–2015

First, BPM enables business process ownership. The importance of business process ownership is greatly emphasized for ERP implementation success (Al-Mudimigh, 2007; Žabjek et al., 2009) as business process ownership makes business process reengineering happen (Žabjek et al., 2009). Second, BPM supports business process identification and understanding through business process modeling (Žabjek et al., 2009). Process models are suggested as key elements in business process improvements (Harmon, 2007). Non-existent or inadequate process documentation is argued to be a reason for failure of business process reengineering efforts (Žabjek et al., 2009). Third, BPM enables value realization from ERP investments by supporting continuous business process improvement and establishing clear and well-defined performance measurement systems (Al-Mudimigh, 2007; Davenport et al., 2004). Organizations can achieve significant value from their ERP implementation if they continue to optimize ERP systems and the business processes they support (Davenport et al., 2004). Therefore, several studies suggest managing an ERP system as an ongoing program and recommend business process redesign as a continuous activity (e.g., Davenport et al., 2004). Value realization not only requires continuous business process improvement but also management and measurement of benefits (Davenport et al., 2004). Organizations seeking benefits from their ERP system establish a performance measurement system and governance for benefit realization (Al-Mashari, 2001; Davenport et al., 2004).

Therefore, the successful implementation of an ERP system calls for BPM to support continuous business process redesign and improvement by establishing relevant BPM capabilities. This section adopts a well-established BPM capability model developed by de Bruin (2009) to discuss BPM capabilities required for business process design during an ERP implementation. As illustrated in Figure 2-2, the BPM capability model incorporates six capability areas — strategic alignment, governance, method, IT, people, and culture. In line with the practical challenges presented in section 1.3, this chapter only covers BPM capabilities vis-à-vis alignment, governance, and methods. With business process design being the first stage of BPM, I adapted the capability area definitions to the more specific business process design context as follows:

- Alignment: Strategic and operational alignment ensures the tight linkage of business process design to organizational strategic priorities, processes, and IT systems.
- Governance: BPG establishes relevant and transparent accountability and decision making processes to guide actions in business process design activities.

- Methods: BPM methods comprise approaches and techniques that support and enable consistent business process design.

Strategic Alignment	Governance	Method	Information Technology	People	Culture	Factors
Process Improvement Planning	Process Management Decision Making	Process Design & Modeling	Process Design & Modeling	Process Skills & Expertise	Responsiveness to Process Change	Capability Areas
Strategy & Process Capability Linkage	Process Roles & Responsibilities	Process Implementation & Execution	Process Implementation & Execution	Process Management Knowledge	Process Values & Beliefs	
Enterprise Process Architecture	Process Metrics & Performance Linkage	Process Monitoring & Control	Process Monitoring & Control	Process Education	Process Attitudes & Behaviors	
Process Measures	Process-related Standards	Process Improvement & Innovation	Process Improvement & Innovation	Process Collaboration	Leadership Attention to Processes	
Process & Customers Stakeholders	Process Management Compliance	Process Program & Project Management	Process Program & Project Management	Process Management Leaders	Process Management Social Networks	

Figure 2-2: Core capabilities of BPM (Rosemann and vom Brocke, 2010)

In addition to these three capabilities, IT, people, and culture are also critical to BPM and herewith business process design activities (Rosemann and vom Brocke, 2010). IT solutions support business process design activities through automated or semi-automated derivation of the process model from log files, and tool support for business process analysis and modeling (Rosemann and vom Brocke, 2010). The people capability comprises human resources and their knowledge and skills in business processes and BPM. Enhancing process skills and expertise, improving BPM knowledge, and establishing process collaboration and communication can support BPM activities, including business process design (Rosemann and vom Brocke, 2010). And finally BPM culture refers to the collective values and beliefs regarding the process-centered organization. An organization's responsiveness to process change, extent of process thinking, commitment to BPM, leadership attention to BPM, and involvement in BPM networks influence its capability for BPM activities, and thus business process design (Rosemann and vom Brocke, 2010). However, due to time and resource limitations and because these capabilities were not the immediate concerns of GEA, this study's focus is limited to alignment, governance, and methodological capabilities. The next three sections provide a review of earlier studies on each of the three capability areas.

2.2 Alignment

BPM is closely linked to an organization's strategy. Business processes are the "only things that connect the dots" to create stakeholder value consistent with organization strategy (Burlton, 2010). Therefore, a process-centric organization must be strategically aligned (Burlton, 2010), that is, business processes need to be designed, executed, managed, and measured according to strategic priorities of the organization (Rosemann and vom Brocke, 2010). In return, specific business process capabilities may offer opportunities to inform the strategy design leading to process-enabled strategies (Rosemann and vom Brocke, 2010). BPM not only translates strategic requirements into operational working processes, but also enables and manages their execution (Burlton, 2010). At the implementation level, BPM builds the technological, human, and infrastructural resources required for executing business processes (Burlton, 2010). Therefore, BPM alignment capability not only ensures business process design in line with business strategy, but also consistent design of business processes and IT systems.

Seeking guidelines for aligning business process design with corporate contingencies, this section discusses two important alignment challenges that often arise during an ERP implementation. One challenge concerns the fit between an organization's business processes and ERP functionalities and embedded processes. The first subsection presents a literature review that discusses three viable approaches for managing the dilemma between ERP adaptation and business process adaptation. Furthermore, when designing business processes for a global ERP implementation, MNCs also face the dilemma between standardization and localization of business processes. The second subsection presents a review of earlier studies on aligning the decision for business process standardization with organizational contingencies.

2.2.1 Business process adaptation and ERP adaptation

The interdependencies between business processes and IT systems are widely recognized by numerous studies (e.g., Smith and Fingar, 2003b; Tarafdar and Gordon, 2007). The interdependencies are especially evident when implementing off-the-shelf IT systems, such as ERP systems, that include built-in work routines and processes (Davenport, 1998; Smith and Fingar, 2003b). Upon adopting ERP systems, conflicts often arise between an organization's business processes and best practices embedded in the system (Davenport, 1998). Achieving alignment between the two is thus one of the principal challenges of ERP implementations. Previous studies report on three different approaches for achieving alignment between business processes and ERP systems. While some studies indicate a technology-driven approach and adaptation of processes to the logic embedded in ERP systems, others specify organizations' willingness to pursue process-driven approaches where the ERP system is adapted to business processes. A third group takes a balanced approach by suggesting simultaneous adaptation of business processes and ERP system.

Studies by Intentia and KPMG estimate the extent of homogeneity of business processes to be over 80% across all industries (Holland et al., 1999). According to a study by Lee et al. (2003), only 5% of the Fortune 1,000 companies that adopted an ERP system chose to modify it to match their business processes. The technology-driven approach to ERP adoption is typically accompanied with a parallel business process reengineering effort that is heavily affected by the ERP system's functionality (Panayiotou et al., 2015). Many studies argue for business process reengineering according to ERP embedded logic as one of the most important success factors for implementing ERP systems (e.g., Jarrar et al., 2000). Two widely different viewpoints encourage technology-driven business processes reengineering. On the one hand, some organizations perceive technology-driven business process reengineering as the necessary cost of ERP implementations due to limited system design and negative impacts of excessive system adaptation on implementation success (Benders et al., 2006; Hong and Kim, 2002; Irani, 2002). A technology-driven approach for ERP adoption minimizes implementation risks, reduces implementation costs, facilitates adoption of future package upgrades, and reduces maintenance costs (Brehm et al., 2001; Light, 2001; Soh et al., 2003; Subramoniam et al., 2009). On the other hand, some or-

ganizations perceive technology-driven business process reengineering as a positive side effect of ERP adoption as it improves the efficiency of business processes by introducing industry best practices (Davenport, 1998; Holland and Light, 1999a; Jarrar et al., 2000).

However, earlier studies reported a number of challenges when adapting business processes to the embedded logic within the ERP system. First, about two-thirds of business process reengineering projects reportedly either fail completely or fall significantly short of intended objectives (Schniederjans and Kim, 2003). Second, misalignments often arise between an ERP system and an organization's contingencies. ERP systems are designed with certain business processes and data models that reflect the vendor's assumptions, norms, and values (Ho et al., 2004; Soh et al., 2003) and therefore the system's assumptions may run counter to an organization's best interests (Davenport, 1998). Third, enacting ERP-embedded processes increases inter-organizational similarities in business processes (Batenburg et al., 2008; Davenport, 1998; Soh et al., 2003). This might result in erosion or even disappearance of an organization's distinctive characteristics. A technology-driven approach to ERP adoption especially fails in organizations that have built their competitive advantage based on unique business processes (Akkermans et al., 2003).

Therefore, an opposing view suggests that business processes should be the driving force behind ERP configuration. Contrary to Lee et al. (2003), Davenport et al. (2004) report that 74% of organizations at least moderately customize their ERP system. Using business processes to inform the design of ERP systems is argued to better reflect business requirements (Rosemann, 2010). Indeed, the process-driven approach to ERP adoption is more consistent with the alignment concept in BPM. To achieve alignment, Burlton (2010) recommends a top-down approach, according to which an organization's strategic direction guides business process design, and in turn business process design directs developing IT capabilities. This view is also evident in Kirchmer (2010) in which business process design is suggested as the input to the BPM implementation phase and thus IT systems configuration. Kirchmer (2010) further applies this top-down view to ERP adoption and argues that as business processes are strongly influenced by an organization's specific offerings and market demands, standard software applications such as ERP systems cannot deliver the required IT support because they reflect the needs of wider user communities. However, the process-driven approach to ERP adoption is not free from challenges. Greater risks, financial costs, and complexities of fitting technology to business processes are some of the downsides of process-driven approach to ERP adoption (Kirchmer, 1998).

To overcome the disadvantages of both approaches, other studies suggest a middle ground between process- and IT-driven approaches (e.g., Davenport et al., 2004; Leonard-Barton, 1988; Subramoniam et al., 2009). By simultaneous ERP and business process adaptation, the balanced approach exploits the role of IT both in supporting and enabling business processes (Davenport and Short, 1990). Although mutual adaptation of business processes and the ERP system is compelling, prescriptions and guidelines for how to manage the balanced approach are scarce. Making the choice between ERP and business process adaptation requires close collaboration between business and IT parties (Karimi et al., 2007), which is often neglected in organizational governance studies, and especially research on BPG.

2.2.2 Business process standardization and localization

ERP systems are designed to solve one important problem: the fragmentation of information in large organizations (Davenport, 1998). Streamlining business processes and improving the flow of information across corporate subsidiaries is a particularly important driver for global ERP implementation in MNCs (Clemmons and Simon, 2001; Hufgard and Gerhardt, 2011; Seethamraju, 2009; Wyss, 2008). Integration improves efficiency, accelerates communication, improves decision making, and enhances headquarters control over remote subsidiaries (Carton and Adam, 2003; Davenport et al., 2004). A misperception underlying global ERP implementations is that they automatically lead to integration across an MNC. Indeed, common business processes and data standards are prerequisites for seamless transactions and information exchange (Gattiker and Goodhue, 2004; Sethi et al., 2008). Implementing global ERP systems as a means to

create a common language (Bingi et al., 1999) requires global consensus on process and data standards (Holland and Light, 1999b). However, conflicts often arise between local and enterprise-wide requirements during process standardization. This raises a fundamental question concerning how much uniformity should exist in the way an MNC does business in different regions or countries (Davenport, 2005). Therefore, the dilemma between process standardization and localization imposes another important challenge for ERP implementation, particularly in MNCs.

Author	Market imperatives and structure	Regulatory structure	Local culture /organizational culture	Local institutions	Corporate governance model	Strategy	National best practices	Management style	Interdependence across MNC	Products, tasks
Davenport (1998)	X	X			X	X				
Gargeya and Brady (2005)			X							
Gattiker and Goodhue (2004, 2005)	X								X	X
Ghosh (2002)		X								
Grabot (2008)							X			
Gulla and Mollan (1999)		X	X				X			
Hanseth et al. (2001)	X	X	X							
Holland and Light (1999b)	X	X								
Jacobs and Bendoly (2003)					X					
Madapusi and D'Souza (2005)						X				
Olson et al. (2005)		X	X				X			
Phelan (2011)	X	X								
Sheu et al. (2004)		X	X					X		
Soh and Sia (2004)				X						
Subramoniam et al. (2009)		X					X			
Wagner and Newell (2004)				X	X					
Wang et al. (2006		X	X	X						
Yen and Sheu (2004)					X					
Zrimsk and Prior (2003)	X									

Table 2-1: Factors influencing process standardization when implementing ERP systems

Process standardization is an axiomatic principle of BPM (Hammer, 2010). Enabling implementation of uniform IT systems, reducing ERP system complexity, and better integration and handoffs across process boundaries are not the only reasons for process standardization. Comparable performance figures, greater agility when introducing changes, presenting a single face to customers, and opportunities for consolidation, outsourcing, and offshoring are additional motives that encourage MNCs to unify process standards across their subsidiaries (Carton and Adam, 2003; Davenport, 1998, 2005; Hammer, 2010; Tregear, 2010). Variation in business processes lead to inconsistent services to customers, costly training, suboptimal operations due to loss of best practices, and increased organizational complexity (Tregear, 2010). Some studies even argue that the real benefits of global ERP implementations become apparent only after process standardization (e.g., Hufgard and Gerhardt, 2011).

Tregear (2010) argues that in a perfect world, the "one true process" would be executed exactly the same way across an organization whether it is a single site operation or spread across a country or spread across many countries. Several studies suggest that operational similarity and producing "the same output" give rise to the potential for process standardization (e.g., Harmon,

2007; Ross et al., 2006; Tregear, 2010). However, while in theory all common processes are standardized everywhere, in practice local variations in business processes are inevitable and necessary. As presented in Table 2-1, previous studies on ERP implementation suggest many different reasons for why business processes are designed and executed differently in organizations and why MNCs face difficulties enforcing best practices across their subsidiaries. Among the most cited factors are differences in regulations and legal requirements (Sheu et al., 2004; Olson et al., 2005), dissimilarities in local market imperatives (Hanseth et al., 2001; Zrimsk and Prior, 2003), and differences in national or organizational cultures (Olson et al., 2005; Sheu et al., 2004). These studies support the contextual embedding view that best practice is situationally specific (Carton and Adam, 2003, Wagner and Newell, 2004).

Indeed, the arguments for process standardization based on similarity of activities and outputs indicates a predominantly mechanistic view to business processes (Melão and Pidd, 2000). BPM's mechanistic view to business processes manifests itself in Davenport and Short's (1990) and Hammer and Champy's (1993) description of business processes (Melão and Pidd, 2000). Davenport and Short (1990) define a business process as a set of logically related tasks performed to achieve a defined business outcome (Melão and Pidd, 2000). Hammer and Champy (2003) provide a similar definition, but also emphasize customer orientation and end-to-end, cross-functional nature of business processes (Hammer, 2010). Viewing business processes as deterministic machines neglects human, organizational, and environmental aspects of business processes and thus their impact on process standardization. The mechanistic view towards business processes cannot explain the facts that process standardization efforts may be hampered by different priorities and habits and may be even completely blocked by political conflicts (Gulla and Mollan, 1999). The mechanistic view cannot either account for the facts that process standardization is typically hindered by universality–individuality and efficiency–flexibility dilemmas (Huber et al., 2000), and unifying process standards does not necessarily yield the same benefits across MNC subsidiaries (Carton and Adam, 2003). Indeed, a lack of attention to sociopolitical and organizational issues is argued to be a major reason for failures in business process reengineering (Morgan, 1997; Willcocks and Smith, 1995).

An alternative view looks at business processes as a set of subsystems of people, tasks, structure, and technology that interact with each other and with their environment (e.g., Earl and Khan, 1994) to fulfill a set of objectives (Melão and Pidd, 2000). Another view emphasizes the subjective human aspects of business processes and sees them as constructs enacted by people (Melão and Pidd, 2000). For instance, Kostova (1999) defines business processes as habitualized actions, routines, and standard operating procedures that reflect an organization's shared knowledge, competences, values, and beliefs embedded in individual skills and collaborative social arrangements. In these definitions the focus extends beyond structural and operational features of business processes; consequently, they provide a better ground for explaining the process standardization difficulties indicated in Table 2-1. However, as the table illustrates, ERP implementation studies only offer a partial view of factors influencing process standardization. Furthermore, despite enumerating the advantages and disadvantages of process standardization, the literature does not provide guidelines for how to determine what should be standardized throughout an MNC and what should be allowed to vary (Davenport, 1998). Two important questions still need to be answered in this regard: how standards should be developed and how compliance should be managed (Tregear, 2010).

2.3 Governance

Business processes need governance at all stages of their life cycles — when they are first designed, when they are operating under "business-as-usual" conditions, and when they need either minor adjustments for changing circumstances or ongoing performance improvements (Kirchmer, 2011; Markus and Jacobson, 2010). Rosemann and de Bruin (2005) suggest BPG as one of the key factors to build BPM maturity in organizations. BPG establishes relevant and transparent accountability and decision making to guide proper design, implementation, execution, and controlling of business processes (de Bruin, 2009; Kirchmer, 2011; Scheer and Brabänder, 2010; Spanyi, 2010).

This section discusses two important topics concerning the governance of business process design in the course of a global ERP implementation. The first section reviews the literature on structural governance mechanisms that enable business process design in organizations and particularly focuses on BPG in MNCs. As business processes influence and are influenced by IT systems, the second section presents a review on collaborations between business and IT parties to investigate how business process design in the course of IT system implementations is coordinated between the two functions.

2.3.1 BPM structure and staffing

Doebeli et al. (2006) suggest one important factor that determines how an organization structures and staffs for managing the business processes is its definition and understanding of BPM. BPM may consist of different activities depending on the type of initiative, the phase within the BPM life cycle, and the level of an organization's BPM maturity (Davies and Reeves, 2010). A review of academic and practitioner literature points to two different approaches for governing BPM activities in organizations: temporary project-based governance and permanent governance.

Business process reengineering, at least in its early days, was positioned as an episodic rather than an ongoing effort (Hammer, 2010). Viewing business process design as one-time projects, several studies have researched temporary governance mechanisms for business process design projects such as project sponsorship, project team management, and participation of stakeholders in the project design team (Becker et al., 2003). A survey by Accenture (2013) shows that a significant number of BPM projects are pursued as classical time-limited projects. This may also indicate the fact that BPM is often not the main reason for these projects, but rather one of the required capabilities for project success. Implementation of IT systems such as ERP systems has often been the trigger for launching episodic business process reengineering initiatives (Harmon, 2010). The downside of the project-based approach to BPM is that the project team's role ends after business processes have been redesigned and implemented. Thus managing effective operation of business processes and their continuous improvement becomes challenging (Markus and Jacobson, 2010). This issue is especially reflected in practitioners' studies on ERP implementation. As the ERP project team dissolves after project termination, organizations usually face problems in sustaining and improving the ERP solution and embedded business processes, as well as realizing value from the investment (Deloitte Consulting, 2010). Such concerns have given rise to alternative governance arrangements for managing the ERP solution after golive. For instance, several practitioner studies have suggested the necessity of establishing an ERP center of excellence after project termination (e.g., Deloitte Consulting, 2010; Kavanagh, 2006).

However, the introduction of continuous process improvement concept has encouraged institutionalization of BPM through a permanent governance structure (Hammer, 2010). Deploying BPM as a management discipline requires new managerial responsibilities to continuously design, measure, and improve the business processes. A study by Accenture (2013) indicates that the largest proportion of surveyed organizations had formally assigned ownership roles for business processes and defined accountability and authority surrounding their processes.

The most visible difference between a process-oriented organization and a traditional one is the existence of process owners (Accenture, 2013; Hammer and Stanton, 1999). Process owners are senior managers with responsibility and authority for designing business processes, and monitoring and assessing their performance (Burlton, 2010; Hammer and Stanton, 1999). Hammer and Stanton (1999) argue that a process owner cannot serve just as an interim project manager, active only when a new process design is being developed; instead process ownership must be a permanent role to drive process design evolution as business conditions change and to prohibit reassertion of old organizational structures. The literature suggests two alternative approaches for allocating the responsibility for process ownership: appointing a functional manager as the process owner or appointing a full-time senior staff member as the process owner who encourages collaboration among the functional managers involved in the process (Hammer and Stanton, 1999; Kirchmer, 2011; Spanyi, 2010). A group of business process managers typically supports process owners with identification and execution of process improvement initiatives and expands the degree of detail in defining and monitoring business processes (Burlton, 2010; Richardson, 2006; Scheer and Brabänder, 2010; Spanyi, 2010). BPG also covers a BPM steering committee accountable for setting, monitoring, and directing the BPM strategy (Scheer and Brabänder, 2010). In addition, BPG typically incorporates a BPM center of excellence that offers training, implementation of BPM regulatory frameworks, process compliance, BPM consultancy services, business process modeling, library management, and support for methodological excellence (Kirchmer, 2011; Rosemann, 2010; Scheer and Brabänder, 2010).

Intra-organizational processes have governance advantages that inter-organizational processes lack. While hierarchical authority may not suffice for governing intra-organizational processes, it does enable BPG by facilitating establishment of formal lateral relations or process organizations (Markus and Jacobson, 2010). Inter-organizational BPG strategies are limited when business processes cross the boundaries of legal entities (Markus and Jacobson, 2010). This issue is also evident in MNCs where subsidiaries have accountability for managing their business processes. However, prescriptions for how to govern BPM in MNCs are scarce. The literature review identified only one study that discusses BPG in the context of MNCs. To manage the global versus local balancing act for managing business processes, Tregear (2010) proposes a two-tier approach for BPG in MNCs. The proposed BPG framework comprises a global process council supplemented with local ones in each subsidiary. The BPM focus at the global level is on creating and managing a global BPM strategy that enables the coordinated management and continuous improvement of local business processes. The local process councils are then responsible for implementing the global strategy adjusted for local conditions and for closing identified process performance gaps.

2.3.2 Collaboration between business and IT parties

Implementing an ERP system is not a matter of changing software systems; rather it is about transforming business processes. Therefore, previous studies warn against viewing ERP implementation as a technological challenge and assigning the responsibility for its implementation solely to IT functions (e.g., Davenport, 1998). Instead, they emphasize the necessity of top management involvement in every step of ERP implementation (Bingi et al., 1999, Davenport, 1998). Business roles play an important role in designing, implementing, and maintaining IT solutions. Therefore, both BPG and ITG frameworks are built around active involvement of business parties in IT management activities. An analysis of literature identifies that business roles involvement in IT management processes enables business–IT alignment and IT-enabled business value realization. Indeed, the responsibilities for business–IT alignment and IT-enabled business value realization are included within both BPG and ITG frameworks.

Ensuring that IT investments support an organization's business strategy and business processes is an essential role of BPG (Spanyi, 2010). To enable business–IT alignment, the overall business strategy must be tied to various IT initiatives through business processes and their information requirements (Feurer et al., 2000; Luftman, 1996; Tallon, 2007; Trkman, 2010). In other words, strategy sets the direction for process specification, which is then used as the guideline for the implementation, configuration, and customization of IT systems (Luftman 1996; Tučková

and Tuček 2011). As a BPM function is responsible for design and implementation of business processes (Kirchmer, 2011), accountability for linking business strategy to IT initiatives naturally falls within the BPG framework. Indeed, the general business process structure and strategy, underlying application system architecture, and alignment between the two are decided in BPM strategies (Burlton, 2010; Tučková and Tuček, 2011). Therefore, aligning BPM efforts to strategic business and IT goals, choosing the optimal mix of IT investments based on their contribution to business process improvement, and providing the demand analysis and blueprint for IT implementations are some of the IT-related responsibilities of process roles (Hongjun and Nan, 2011; Korhonen, 2007; Novotny and Rohmann, 2010; Scheer and Brabänder, 2010; Trkman, 2010; Tučková and Tuček, 2011). Consequently, process roles are typical members of business–IT alignment teams (Luftman and Brier, 1999) and are suggested to have an understanding of the IT systems used in their business area (Scheer and Brabänder, 2010).

Besides business–IT alignment, a second essential role of BPG is to ensure that the payoff from IT investment is directly derived from the specific investments in business processes (Spanyi, 2010). As first-order impacts of IT arise at the business process level (Melville et al., 2004; Tallon, 2007), the business value derived from IT investments will only emerge when new and adequate business processes are designed, executed, and monitored (Masli et al., 2011; Spremić, 2009; Van Grembergen and De Haes, 2009). Because, by definition, the accountability for ensuring the proper design, implementation, execution, and monitoring of business processes falls within the BPG framework (Kirchmer, 2011), process roles obviously play an important role for realizing business value from IT investments. More specifically, it is typically the responsibility of process owners and managers to monitor business processes and plan for their continuous improvement (Scheer and Brabänder, 2010).

IT management literature and ITG frameworks also emphasize the necessity of business involvement in IT decision making to ensure business–IT alignment. IT strategic alignment is one of the main facets of ITG and the ultimate outcome of enterprise governance of IT (Van Grembergen and De Haes, 2009). To ensure alignment of IT decisions with business requirements, ITG capabilities include liaison positions and process integration mechanisms for enabling horizontal contacts between business and IT management functions (De Haes and Van Grembergen, 2009; Peterson, 2004). Business involvement in IT decision making enhances IT managers' understanding of business requirements and enables business managers' proactive behavior (Peterson, 2004). Business roles that take the liaison positions in ITG structure are responsible for establishing and communicating strategic direction to IT leaders, and participating in strategic and operational IT decision making for IT principles, IT architecture, IT investment and prioritization, and business application needs (ITGI, 2003; Rau, 2004; Weill and Ross, 2004).

Value delivery is another main facet of ITG (Posthumus et al., 2010; Van Grembergen et al., 2004; Wilkin and Chenhall, 2010). As benefits from IT investments mainly emerge from changes to ways of working, research on ITG argues that only business managers and users can be held accountable for realizing business benefits enabled by IT investments, and therefore call for their higher level of involvement in IT projects (e.g., Weill and Ross, 2009). More specifically, Rau (2004) assigns accountability for realization of IT-dependent business goals to non-IT roles with a seat in the ITG structure.

While these studies suggest that business roles, and particularly process roles, are actively involved in IT strategic and operational decisions, IT managers and consultants also play an important role in BPM activities. IT systems can shape and facilitate new ways of working (Davenport, 1993; Peppard et al., 2007; Smith and Fingar, 2003b). IT competences are suggested to affect the conception, development, and implementation of process innovations (Tarafdar and Gordon, 2007). Few studies highlight the importance of IT participation in process innovations and suggest inclusion of IT subject matter experts in major process improvement efforts and BPM teams (e.g., Spanyi, 2010; Tarafdar and Gordon, 2007). This is to avoid complex IT architecture (Fonstad and Robertson, 2006), and to reduce the risk, complexity, and financial costs of IT implementations (Beatty and Williams, 2006).

While these studies emphasize the need for IT roles involvement in BPM activities on the one hand, and process roles inclusion in IT management activities on the other, collaboration between BPM and IT management functions is not reflected in their governance frameworks. ITG is established based on active involvement of business parties in IT management processes. However, while BPG literature suggest process roles responsible for business–IT alignment and IT-enabled business value realization, ITG frameworks overlook the role of BPM functions in IT management activities. Still, ITG structural mechanisms include business liaison positions. This feature is, indeed, missing in BPG frameworks. BPG studies often neglect the IT dimension of BPM activities, and thus BPG structural mechanisms do not comprise any position for IT managers and consultants to enable their participation in BPM activities. As BPM and IT initiatives are not implemented in isolation, there is a need for a new perspective defining BPG and ITG frameworks to enable their interoperability.

2.4 Method

In the context of BPM, methods are the set of tools and techniques that support and enable activities along the process life cycle and within enterprise-wide BPM initiatives (Rosemann and vom Brocke, 2010). Distinct methods can be applied to major, discrete stages of the process life cycle. As BPM approach starts with the identification of the key processes of an organization, process design is typically associated with methods used to identify and conceptualize current business processes and future ones. The core of such methods is not only limited to process modeling techniques but also covers process analysis approaches (Rosemann and vom Brocke, 2010).

This section first discusses business process modeling and its application for business process design during IT systems implementation, and particularly implementation of ERP systems. Second, seeking methods that can improve business process design activities, this section introduces enterprise architecture management (EAM) as a method for consistent and integrated design of an organization, including its business processes.

2.4.1 Business process modeling

The term business process modeling refers to all activities related to the transformation of knowledge about business systems into models that describe the processes performed by organizations (Giaglis, 2001). It includes graphical depictions of at least the activities, events, states, and control flow logic that constitute a business process (Recker et al., 2009). Business process modelling has gained importance in both management and IT communities since the introduction of the process-centric view of organization management by Hammer and Champy (1993) (Nurcan et al., 2005).

Krogstie et al. (2008) distinguish between five main categories of process modeling application. First, by providing a graphical representation of business processes, it enables ease of communication and a common understanding of existing and future processes (Davies and Reeves, 2010). For a process-oriented improvement project to be successful – whether its goal is to improve customer satisfaction or introduce an ERP system – a deep understanding and communication of the existing and future processes between various stakeholders is required (Reijers et al., 2010). Second, the "documented knowledge" provides the means for structured analysis and identifying improvement opportunities (Davies and Reeves, 2010). The content of process models typically is the input to process analysis through simulation or deduction (Aagesen and Krogstie, 2010). Third, process models can simply act as a reference point for quality management and follow up on the adherence of work processes to standards and regulations (Aagesen and Krogstie, 2010; Becker et al., 2003). Fourth, process models may be directly implemented and deployed in an IT system. And fifth, process models can be used as the context for a system development project (Aagesen and Krogstie, 2010).

As the first item in the above list specifies, business process modeling is a key instrument for the analysis, design, and evaluation of process-aware IT systems (Barjis, 2008). Process modeling focuses on understanding the underlying business processes which many IT professionals believe is fundamental to the successful implementation of IT-based changes in organizations (Aguilar-Saven, 2004; Green and Rosemann, 2000). Business process design reflected in process models can be transformed into technical specifications to inform IT system selection, configuration, and integration (Lee et al., 2003; Rosemann, 2010). Several studies particularly recognize the positive impact of business process modeling on ERP implementation success (e.g., Barjis, 2008; Stemberger et al., 2009). Business process modeling drives the requirements engineering cycle during ERP implementations and is the key to acquiring, communicating, and validating enterprise knowledge and business requirements (Becker et al., 2003; Daneva, 2004; Scheer and Habermann, 2000). A common language for acquiring and communicating requirements is especially important when implementing an ERP system across several organizations (Scheer and Habermann, 2000). Process models can also be used to communicate the best practices embedded in the ERP system to assess their fitness to business requirements (Becker et al., 2003).

As the second item in the list specifies, business process modeling not only facilitates communication and understanding of business processes during requirements engineering, but also enables analysis for business process reengineering prior to or during ERP implementations (Aguilar-Saven, 2004). Especially, when implementing global ERP systems, business process models enable process standardization by highlighting the functional and structural variations in existing business processes. This allows a systematic analysis of process variances, and obviates uncontrolled growth of processes and new variants when designing or redesigning business processes (Heinrich et al., 2009). A better understanding obtained by an explicit representation of business processes enables improving organizational performance via business process reengineering and design of IT solutions that best fit the reengineered processes (Nurcan et al., 2005). However, process modeling is not without its critics.

Current process modeling techniques lack contextualization (Recker et al., 2009). In addition to the control flow, a comprehensive business process model may include some information about the organizational units involved in the process, the input and output data of a process, and the output which describes the result of the process (Green and Rosemann, 2000). The "de-facto" standards for business process modeling such as Business Process Modeling Notation or Event-driven Process Chain typically underrepresent systems structured around business processes (Aagesen and Krogstie, 2010; Samaranayake, 2009). Lack of contextualization in business process modeling may again indicate the dominance of mechanistic view to business processes.

The process view alone is not sufficient to model all the real-world constructs required for managing business processes (Green and Rosemann, 2000). While business process modeling appears to be a corner stone to help organizations improve operational performance, management of an organization in the face of strategic challenges requires a more systematic and holistic view of the organization (Nurcan et al., 2005). Business process design has its foundation in business strategies (Lankhorst, 2005). To tackle the challenges for transforming business strategy into actual business processes, there is a need for understanding a wide range of business elements and how they are related to each other (Lankhorst, 2005). Previous studies especially emphasize the need for integrating process models with corporate goals and objectives (e.g., Becker et al., 2003; Nurcan et al., 2005). A goal-driven business process modeling approach that captures the relationship between an organization's strategic goals and the tasks realizing them better supports business process reengineering and requirements engineering during IT system implementations (Nurcan et al., 2005). Furthermore, the distinction between business process design and IT system design in practice is also reflected in modeling methodologies, where most approaches concentrate on one end of the scale, leaving the question of business–IT alignment outside their scope (Giaglis, 2001). Because the process view does not have representations for IT systems, the process view's usefulness for defining the scope and boundaries of the IT system being analyzed is undermined (Green and Rosemann, 2000).

To enhance business process modeling support for business strategy planning and IT systems design, some other symbols or views are required (Green and Rosemann, 2000). Representational support for conceptualizing the system and environment in which a process is embedded can be a starting point for the specification of context-aware and truly agile processes (Recker et al., 2009). Yet, most studies on BPM during ERP implementations are confined narrowly on business process modeling (Samaranayake, 2009).

2.4.2 Enterprise architecture

ISO 42010:2011 defines architecture as the fundamental organization of a system, embodied in its components, their relationships to each other, and to the environment, and the principles guiding its design and evolution. According to this definition, enterprise architecture (EA) is an organization's basic structure and inherent design (Bradley et al., 2012; Gøtze, 2013; Radeke, 2010). Enterprise architecture management (EAM) is then the general process of managing, maintaining, and developing EA in a holistic and purposeful manner (Radeke, 2010).

Previous studies suggest two different perspectives on EAM: descriptive and prescriptive. According to the descriptive view, the notion of EAM captures all those processes, methods, tools, and responsibilities needed to build a holistic and integrated view of EA (Simon et al., 2014). By providing a holistic view of EA, EAM supports communication, coordination, and decision making for organizations' structured transformation from the current towards intermediate and long-term planned EA states (Labusch and Winter, 2013; Rood, 1994; Schelp and Winter, 2009; van der Raadt and van Vliet, 2009). Moreover, EAM facilitates setting clear directions for EA transformation through plans and roadmaps (Ahlemann et al., 2012; Löhe and Legner, 2014; Ross et al., 2006; van der Raadt and van Vliet, 2008). According to the prescriptive view, EAM governs consistent design and evolution of EA through principles, standards, guidelines and procedures that prescribe how EA should be realized (Abraham et al., 2012). In both interpretations, EAM has a supportive role and complements an organization's strategy formation, planning, and implementation processes (Ahlemann et al., 2012; Radeke, 2011).

EAM is typically institutionalized through an EA function comprising various architect roles. Enterprise architects are responsible for providing advice to senior management for EA decision making by creating and maintaining a multi-perspective view of EA, and validating conformance of any architectural changes to current and target EA, EA roadmap, and EA policies (van der Raadt and van Vliet, 2008). EA function typically provides two types of EA products: EA documents and policies. While EA policies specify standards, rules, and guidelines for organizational changes, EA documents provide an abstraction of EA and act as a means of communication and decision making (van der Raadt and van Vliet, 2008).

However, how and exactly for what purposes EAM is used varies greatly in organizations. EA has always been a concern of those in IT and the goal of EAM has traditionally been on ensuring coherent and consistent design of IT systems (Harmon, 2010; Hoogervorst and Dietz, 2013). IT-centric EAM supports IT application and infrastructure portfolio management, consolidation of the IT landscape, controlling the growth of technical diversity, and architecture technical compliance assessment (Boh and Yellin, 2006; Riege and Aier, 2009). More importantly, IT-centric EAM enables business–IT alignment (Lapalme, 2012; Radeke, 2010; Winter et al., 2007). To effectively execute business strategy and operations, the IT-centric EAM approach supports IT management in alignment with business context, especially business processes that address organizational changes (Wißotzki et al., 2013). However, in the IT-centric view to EAM, business elements are basically context variables to which IT must align (Lapalme, 2012; Simon et al., 2014).

Some of the more recent studies criticize the IT-centric view to EAM and suggest expanding EA scope to include business architectural elements as design variables (e.g., Hoogervorst, 2004; Ross et al., 2006; Simon et al., 2014). This view corroborates that successful execution of change requires a constructional perspective on all domains of an organization (Hoogervorst, 2004). Therefore, these studies suggest business functions, business processes, and organizational structure, and in some cases even business strategic elements as typical components of EA (e.g., Hoogervorst, 2004; Lankhorst, 2005; Ross et al., 2006; van der Raadt and van Vliet, 2009). With a wider scope, EAM application can extend to support consistent design and evolution of an organization as a whole (Hoogervorst, 2004). Several studies suggest application of EAM for business strategy formation in alignment with the organization's environment (e.g., Hoogervost and Dietz, 2013; Radeke, 2011; Simon et al., 2014; Winter and Schelp, 2008). Other studies suggest EAM as a tool that facilitates enacting business strategy by guiding translation of broader principles and goals into business processes and organizational structure that enable realization of those goals (e.g., Lankhorst, 2005; Ross et al., 2006; Tamm et al., 2011; van der Raadt and van Vliet, 2009; Wißotzki et al., 2013). Integrated design of business and IT elements also facilitates mutual consistency, better management of changes to business and IT, and the right balance between business innovation and IT efficiency (Hoogervorst, 2004; Lankhorst, 2005; Wißotzki et al., 2013).

The multi-perspective approach and the integrated view of business strategy, business processes, and IT systems empower EAM to complement BPM activities for business process design and

IT configuration. However, EAM application for business strategic management does not appear to receive much consideration in the literature and in practice (Simon et al., 2014). Despite the emphasis on extending EA scope to cover business architectural elements, the research in this area is still in its infancy and there is not too much agreement on exactly how to do it (Harmon, 2010). In practice, the work of the EA function is still perceived as being primarily IT-focused (Hauder et al., 2013; Winter and Schelp, 2008). In addition, there is a lack of alignment between EAM and BPM programs (Olding and Rosser, 2009). A recent survey by Accenture (2013) reports disconnects between BPM and EA functions in organizations.

2.5 Theoretical challenges

Previous sections reviewed the extant literature vis-à-vis the practical challenges discussed in section 1.3. Table 2-2 summarizes the identified theoretical gaps for purposes of addressing these practical challenges.

	Practical challenges	Theoretical challenges
Alignment	What contingency factors are decisive for business process design in the course of a global ERP implementation? How should process standardization be aligned with corporate contingencies?	Although acknowledging that process standardization may be hindered by personal preferences, power relations, and cultural differences across an MNC, the BPM literature adopt a mechanistic view to business processes and encourage process standardization based on the similarity of process structure and outputs. ERP implementation studies better emphasize the impact of human, organizational, and environmental aspects of business processes on process standardization, but do not provide a holistic understanding of factors influencing process standardization. Furthermore, while there are compelling arguments for and against process standardization, earlier studies do not provide guidelines for resolving the dilemma between process standardization and localization in the course of a global ERP implementation.
Governance	What governance mechanisms enable business process design in the course of a global ERP implementation?	Previous studies suggest two different approaches for structuring and staffing BPM activities. Considering BPM, and particularly business process design, an episodic activity, some studies suggest temporary governance mechanisms for managing business process design projects. This approach is popular when implementing IT systems, particularly ERP systems. However, this often necessitates alternative governance arrangement after the project termination to maintain the ERP solution. Other studies consider business process design a continuous activity and therefore argue for establishing permanent ownership of business processes. There are scarce studies on BPG in the context of MNCs.
		To preserve an organization's competitive advantages and to avoid excessive complexities of fitting an ERP system to business processes, literature suggests mutual adaptation of the ERP system and business processes. However, there are scarce studies on how to operationalize this approach. Particularly, collaboration between BPM and IT management functions is neglected in their governance frameworks. To enable business–IT alignment, IT management studies emphasize the need for business involvement in IT decision making and particularly encourage active involvement of top management in ERP implementation. However, they overlook the role of BPM function in IT decision making. This is despite the fact that BPM studies suggest process roles to be accountable for business–IT alignment. In addition, although few BPM studies suggest IT involvement in BPM initiatives, BPG frameworks fail to include IT liaison positions in their structure to facilitate IT participation in BPM activities. Consequently, the interdependencies between business processes and IT systems are not reflected in BPG and ITG frameworks.

	Practical challenges	Theoretical challenges
Method	Which methods promote consistent and integrated business process design in the course of a global ERP implementation?	Most methods for business process design are confined narrowly on business process modeling. Process-centric modeling approaches underrepresent systems structured around business processes and therefore cannot properly support consistent business process reengineering prior to or during ERP implementation in alignment with other enterprise architectural elements such as business strategy and IT components. By providing a multi-perspective approach, EAM can support consistent and integrated design of an enterprise as a whole; however EAM is still perceived as being primarily IT-focused and its application for BPM has not received much consideration in academia or practice.

Table 2-2: Theoretical challenges for business process design in the course of ERP implementation

As Table 2-2 indicates, the earlier studies do not provide a holistic understanding of the factors that influence business process design, and in particular process standardization, in the course of a global ERP implementation. They neither provide guidelines for aligning the decision for process standardization with corporate contingencies to resolve the dilemma between process standardization and localization. When it comes to the governance capabilities, the literature is parted between temporary and permanent governance mechanisms for managing business process design activities. Furthermore, there are scarce studies on BPM structuring and staffing in MNCs. In addition, despite the fact that business process and IT system designs are highly interdependent, the BPG and ITG frameworks do not reflect these interdependencies. This is especially a problem when organizations decide for a balanced approach for ERP adoption and mutual adaptation of the business processes and ERP system. Finally, although alignment is an important topic when designing business processes, the earlier modeling methods for enabling business process design activities are predominately process-centric and do not cover other architectural elements to which business processes need to be aligned. Despite EAM's potential for supporting consistent and integrated design of business processes, its application is still primarily IT-focused. To resolve the practical challenges, this PhD study addresses some of these theoretical challenges.

2.6 Chapter summary

To address the practical challenges presented in section 1.3, chapter 2 provided an overview of the earlier studies on BPM capabilities. First, the chapter discussed alignment with respect to two important challenges when implementing an ERP system, namely the dilemma between process standardization and localization, and the choice between process-driven and technology-driven system adoption. Second, it elaborated on BPM governance capability by reviewing the literature on governance mechanisms that enable business process design and also the interoperability between BPG and ITG in support of integrated design of business processes and IT systems. Third, it described business process modeling as the BPM methodological capability supporting identification, communication, and analysis of business processes and enumerated the advantages and disadvantages of a process-centric modelling approach for business process design. It then continued to introduce EAM as an approach supporting the holistic and integrated design of organizations. It concluded by contrasting the theoretical challenges against the practical challenges, which paved the way for future research.

3 RESEARCH APPROACH

In the conduct of scientific research, the actions of researchers are guided by the systems of belief by which they generate and interpret knowledge claims about reality (Wynn and Williams, 2012). These systems of belief are represented in the research ontology, epistemology, and methodology (Wynn and Williams, 2012). Ontology refers to our assumptions about the nature of reality; epistemology refers to our assumptions regarding how we come to know about our world; and methodology is concerned with the means by which we create the knowledge (Dobson, 2001; Wynn and Williams, 2012). This chapter describes the philosophical grounding and methodological elements that this thesis is built on. The critical realist paradigm sets the ontological and epistemological basis for the study, whereas the engaged scholarship based on basic science research and the case study methodology direct the research design, data collection, and data analysis. This chapter also outlines the research process and design of this PhD study and concludes with a discussion on research validity.

3.1 Philosophical grounding

Research has long been dominated by the two philosophical paradigms of positivism and interpretivism (Smith, 2006; Wynn and Williams, 2012). On the one hand, positivism in its extreme form is characterized by an empiricist view that asserts anything which cannot be perceived cannot exist (Mingers et al., 2013; Smith, 2006). The Humean view of causation embedded in positivism suggests that science comprises the systematic observation and recording conjunctions of observable events, description of these event regularities in the form of general laws, and prediction of particular outcomes from the laws (Mingers, 2004; Mingers et al., 2013). On the other hand, interpretivism takes knowledge limitations on being to be limitations on being itself (Mingers et al., 2013). The ontological position of interpretivists is generally either an internal or a subjective realism that views reality as a personal or social construction (Smith, 2006). Interpretivism in its extreme form rejects the notion of causality, and thus the positivist goals of prediction, in favor of subjective descriptions (Smith, 2006).

However, both positivist and interpretivist views of reality are extensively criticized. On the one hand, the positivist reliance on a Humean notion of causality as a constant conjunction of events is argued to be insufficient as a form of explanation as it does not adequately account for deeper causal explanations that link empirical events (Smith, 2006; Wynn and Williams, 2012). Furthermore, positivistic generalization is confronted with Hume's truism that generalization is never fully justified logically (Tsang and Williams, 2012), as one cannot logically extrapolate to settings and contexts not represented in one's sample (Smith, 2006). On the other hand, the interpretivist ontology based on relative reality and thus its rejection of research regulation by

reality makes interpretivist research irrelevant and not interesting (Smith, 2006). The interpretivist rejection of the causal power of the natural and social worlds opposes their inclusion of this world in their research (Smith, 2006). Moreover, interpretivism's ontological position in relativism and its focus on context make it impotent in generalizing knowledge gained from research (Smith, 2006).

The inadequacies in positivist and interpretivist assumptions led to the emergence of critical realism (Mingers et al., 2013; Smith, 2006), originating in the work of Bhaskar (2008). Critical realism suggests that there is an existing, causally efficacious world independent of our knowledge (Mingers et al., 2013). However, by asserting that real objects are subject to value-laden observation (Dobson, 2002) and our access to this world is limited and mediated by our perceptual and theoretical lenses (Mingers et al., 2013; Morton, 2006), critical realism makes a distinction between the ontological domain of existence and epistemological domain of knowledge (Mingers et al., 2013). This distinction allows for the combination of ontological realism with epistemological relativism (Smith, 2006). Knowledge is always historically and socially located; theories are fallible and changeable, but presumably less so over time; and there will always be a number of competing theories (Mingers et al., 2013; Smith, 2006; Wynn and Williams, 2012). Although choosing between theories is not straightforward given the socially constructed and value-laden nature of theories, a judgmental rationality is possible in critical realism (Smith, 2006).

Considering natural and social realities as open systems, the goal of a critical realist study is explanation of the structures and mechanisms that generate a certain event (Morton, 2006; Wynn and Williams, 2012). Critical realism accomplishes this goal by distinguishing among three ontological domains: the real that consists of physical or social objects and structures of reality and the causal mechanisms inherent to the objects of these structures, the actual that includes the events which occur when the mechanisms of structures and objects are enacted, and the empirical that consists of those events which we are able to experience (Wynn and Williams, 2012). Critical realism then describes causality by detailing the means or processes by which events are generated by structures, actions, and contextual conditions involved in a particular setting (Wynn and Williams, 2012). Consequently, critical realism allows for a new type of generalization in which generalization does not come from a movement of empirical events in one context to empirical events in a novel context, but rather it results from uncovering the underlying essence of things (Smith, 2006). However, the structure and mechanisms of real objects do not predetermine what will happen and only enable what can happen through the working of their mechanisms within contexts. The relationship between mechanisms and their effects is not fixed. Whether or not a mechanism is actually activated depends on conditions whose presence and configuration are contingent. Even when mechanisms are exercised, the actual effects of the mechanisms will depend on the conditions in which they work (Smith, 2006). The structures and mechanisms may counteract each other in such a way that no events are generated (Smith, 2006). Thus, mechanisms are better thought of as tendencies of structures and not universal laws (Smith, 2006).

With the ontological assumption that an independent reality does exist but that my senses, values, and beliefs pose limitations to its full cognition, I have grounded this study on the critical realism paradigm. The choice of critical realism was also in line with the nature of the object under study and the purpose and expectations of the study.

Critical realism fit well with the nature of the topic under study. In an information systems context, we are confronted with a sociotechnical environment consisting of several interacting structures, such as a social structure consisting of individuals, groups, and organizations, along with a set of rules and practices, technological artifacts, and discursive entities such as language and culture (Wynn and Williams, 2012). Similarly, designing business processes in the course of a global ERP implementation is a sociotechnical intervention into the open system of the organizational setting in which interactions among technology structures, social structures, and cultural aspects occur through the design activity itself. As such business process design triggers various kinds of responses from the existing structure. While the outcomes of these interactions

are unpredictable, an analysis of the setting may allow tendencies and potential outcomes to be identified. Critical realism's ability to contain the relation of the natural world and the social world within a single consistent model of reality (Mingers, 2004) supports explaining complex interactions that occur between people and technology (Carlsson, 2011). Although historically most information systems research was underpinned by positivist philosophy, there is a growing interest in using critical realism as the underlying philosophy in information systems research (Dobson, 2002; Mingers, 2004). Indeed, the critical realism paradigm has been proposed as a means for resolving inconsistencies between stated philosophical assumptions and actual practices of information systems research (Smith, 2006).

Critical realism could also support the research problem and what I intended to learn. The objective of this study is to provide in-depth answers to the questions of why business process design is critical in the course of a global ERP implementation and how to support and improve it. Researchers are only able to understand and so change the social world if they identify the structures and mechanisms that generate the events or discourses (Carlsson, 2010). Therefore, the first step to support and improve business process design in the course of a global ERP implementation is to use knowledge derived from experience for identifying and understanding the structures and mechanisms that must exist to cause positive or negative outcomes in such efforts. Critical realism offers a notion of causality that is consistent with the quest for answering the "why" questions (Smith, 2006). It allows development and support of causal explanations for the outcomes of such sociotechnical phenomena by taking into account the breadth of IT, social, organizational, and environmental factors that may have played a causal role in their occurrence (Wynn and Williams, 2012). Interpetivism could not support the research objective as interpretivism's focus is on how knowledge is created rather than whether it is true or valid (Wenneberg, 2002). Positivism and its notion of causality as a constant conjunction of events also could not support this study with capturing the underlying unobservable structures and mechanisms leading to certain events when designing business processes in the course of a global ERP implementation (Smith, 2006). Nor could critical rationalism, as a post-positivist philosophy, support the objective of this study. My intent was not to formulate a set of hypotheses for falsification. Due to the sociotechnical environment within which business process design and global ERP implementation activities are embedded, I do not believe that a hypothesis about the applicability of certain BPM capabilities for supporting and improving business process design can be described by a set of rules that is laborious to disprove.

In addition, critical realism provides an ontology that strongly asserts the crucial role of meanings (Smith, 2006). As objects in social science are based on meanings, Bhaskar suggests that clarity of concepts be given the same attention in social science as exact measurement receives in natural science (Buch-Hansen and Nielsen, 2007). Therefore, critical realism could support another objective of this study, namely clarifying concepts related to business process design and global ERP systems.

3.2 Research methodology

This PhD thesis is conducted as basic science research built on five studies. The five studies investigate the BPM capabilities within the focus of this research based on case studies. This section provides a description of basic science research and case study research and my arguments for selecting them as the research methodology for this PhD study. This section further describes the research process and research design of the study and concludes with a discussion of study validity.

3.2.1 Basic science research

When formulating this thesis, to generate knowledge that strikes a balance between rigor and relevance for theory and practice, I adopted engaged scholarship (van de Ven, 2007), also referred to as collaborative practice research by Mathiassen (2002). Engaged scholarship takes a pluralistic view of science and practice as distinct knowledge that can provide complementary

insights for understanding reality (van de Ven, 2007). Engagement is a relationship that involves negotiation and collaboration between researchers and practitioners in a learning community to produce knowledge that can both advance the scientific enterprise and enlighten a community of practitioners (van de Ven, 2007). To do this, a mode of inquiry is needed that converts the information obtained in interaction with practitioners into actions that address problems of what to do in a given professional domain (van de Ven, 2007). Engaged scholarship can be practiced in many different ways. Van de Ven (2007) suggests four different forms of engaged scholarship depending on the purpose of the research — to examine basic questions of description, explanation, and prediction or applied questions of design, evaluation, or action intervention — and the research perspective — the degree to which a researcher examines the problem domain as an external observer or an internal participant. As illustrated in Figure 3-1, van de Ven (2007) classifies these four forms as informed basic research, collaborative basic research, design research, and action research.

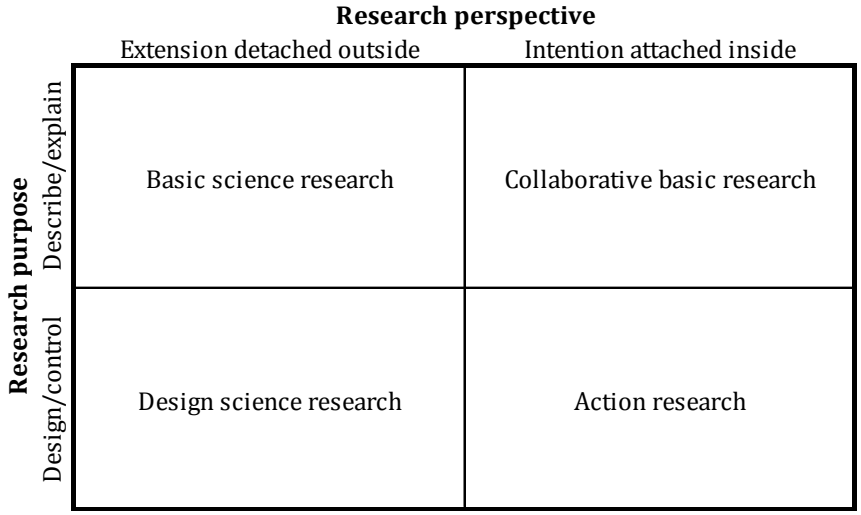

Figure 3-1: Alternative forms of engaged scholarship (van de Ven, 2007)

Answering the research questions, I adopted basic science research. According to van de Ven (2007), basic science research is undertaken to describe or explain a social phenomenon where the researcher is a detached outsider of the social system being examined but solicits advice and feedback from key stakeholders and inside informants on the research activities. Although I was actively involved in the change process in GEA and developing and establishing BPM capabilities supporting and improving business process design, I did not plan the research based on action research or design science research for two reasons. First, there was a high level of uncertainty around how the global ERP program would evolve, which could have negatively influenced whether the research process could be structured. Second, due to the significance and magnitude of the program, I had limited influence over the change process. Implementing some of the BPM capabilities suggested based on research findings, demanded changes outside the boundaries of the global ERP program. The restricted influence would have limited the potential for taking and evaluating actions or implementing and assessing design artifacts if I had chosen action research or design science research as the primary research methodologies.

Considering the uncertainties around the program evolution and limitations on my interventions in GEA, I chose to take an outsider perspective and examine my observations and experiences inside GEA along with case studies in other organizations to first understand and explain the business process design in MNCs and then use this understanding to prescribe BPM capabilities that could support and improve the practice. Adopting basic science research through case studies, I could study representative instances of the phenomenon and could better control the research process. Synthesizing my studies of several cases could also better support the validity of findings and conclusions. I was the only researcher in the field and had full control over research activities. Because I did not share the research activities with the practitioners, the re-

search cannot be categorized as collaborative basic research as defined by van de Ven (2007). (Note: Collaborative practice research as suggested by Mathiassen (2002) is equivalent to van de Ven's (2007) definition of engaged scholarship. Therefore, one should not confuse collaborative basic research (van de Ven, 2007) with collaborative practice research (Mathiassen, 2002).) While an outsider approach towards studying a practice separates the research from practice (Mathiassen, 2002), my engagement in GEA and thus my awareness of the practical challenges, and the global ERP program managers' involvement in defining the research focus, ensured the relevance of the research and its outcomes. Furthermore, functioning as a practitioner in GEA, I did not solely rely on my interpretations of other practitioners' actions and beliefs, but the sense-making process also encompassed my own observations, first-hand experiences, and actions.

3.2.2 Case study

Critical realism recognizes the existence of different types of objects of knowledge—physical, social, and conceptual; thus it suggests the need for a variety of research methods to access those objects (Mingers et al., 2013). Particular choices should be based on the nature of the object of study and what one wants to learn about it (Easton, 2010). I adopted the case study methodology for conducting the five studies that comprise this PhD thesis.

Although Bhaskar does not recommend a specific research methodology for critical realism, several critical realist researchers have encouraged adopting the case study methodology for critical realist studies (Wynn and Williams, 2012). A case study is an empirical enquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomena and context are not clearly evident (Yin, 2009). Therefore, the case study method accords well with the critical realist view that closure conditions are rarely achievable in the social sciences (Tsang, 2014). The case study method is also in line with critical realist's objective of exploring the interaction of structure, events, actions, and context to identify and explicate causal mechanisms (Wynn and Williams, 2012). The case study method could support the research object and objective of this thesis. The choice of case study was in line with the "how" and "why" questions being posed in this study and my limited control over events. I also used the case study method because of my intention to cover contextual conditions pertinent to the sociotechnical phenomenon of business process design in the course of a global ERP implementation.

The case study as a research methodology comprises an all-encompassing method, covering the logic of design, data collection approaches, and data analysis techniques (Yin, 2009). Therefore, in this subsection I elaborate on the case study method deployed in this study. Prior to that, I describe the research process of this PhD study along with my engagements in GEA.

3.2.3 Research process

As illustrated in Figure 3-2, I conducted this study in three stages of clarification, description, and prescription. The clarification stage defined the research focus based on practical and theoretical challenges. The description stage analyzed and explained the phenomenon of business process design in global ERP implementation. And finally, the prescription stage used the findings from the description stage to answer the main research questions. To simplify the process, the three stages are represented in a sequence; however, I need to emphasize the non-linear, iterative nature of the research process for the current work and the fact that some stages ran in parallel. In the following, I describe the activities in each of these stages in more detail.

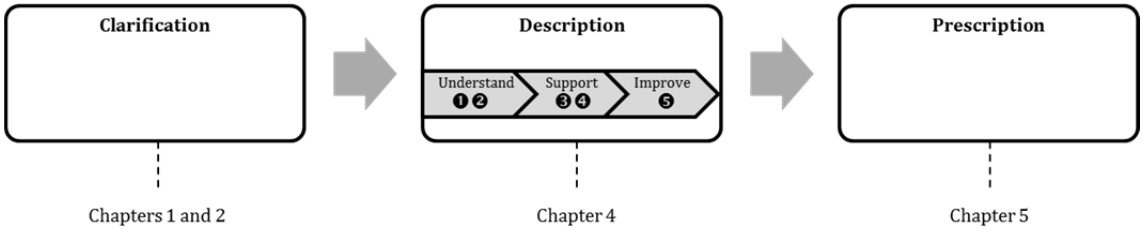

Figure 3-2: Research process

3.2.3.1 Clarification

The objective of the clarification stage was to identify the focus of the study, the main research problems and questions, and the areas in which a contribution was expected. As described in section 1.2, I formulated the three research questions of this thesis based on the collaborative research approach suggested by Mathiassen (2002) to generate knowledge that provides an understanding and supports and improves the practice of business process design in the course of a global ERP implementation in MNCs. I then narrowed down the scope of these three research questions based on existing practical and theoretical challenges. To ensure research relevance, I sought to ground the focus in the practical problems GEA was facing (chapter 1). Simultaneously, by identifying and addressing gaps in the extant literature, I ensured the PhD study's rigor and its contribution to the existing body of scientific knowledge (chapter 2). The analysis of practical and theoretical challenges led to a set of sub-questions that were more focused and descriptive and explanatory in nature. Table 3-1 presents associations among the main research questions, practical and theoretical challenges, and sub-questions derived from these challenges.

Research question	Practical challenge	Theoretical challenge	Research sub-question
Why is business process design critical in the course of a global ERP implementation?	What contingency factors are decisive for business process design, and in particular process standardization, in the course of a global ERP implementation?	* BPM and ERP implementation studies do not provide a holistic understanding of the impact of structural, human, organizational, and environmental aspects of business processes on process standardization.	* What factors and conditions influence process standardization in an MNC in the course of a global ERP implementation? * How does standardization of business processes and data structure across an MNC influence the choice of ERP architecture?
How can we support business process design in the course of a global ERP implementation?	How should process standardization be aligned with corporate contingencies?	* Guidelines for resolving the dilemma between process standardization and localization do not exist.	* How does an MNC's international management strategy affect process standardization in the context of a global ERP implementation?
	What governance mechanisms enable business process design in the course of a global ERP implementation?	* Studies are scarce on BPG in the context of MNCs, and especially activating business process design as a continuous endeavor. * Studies are scarce on enabling a middle ground between process- and IT-driven approaches for ERP adoption, and on activating collaboration between BPM and IT management functions in support of business process design.	* How is the BPM function structured in MNCs? * Why and how do BPM and IT management functions collaborate?
How can we improve business process design in the course of a global ERP implementation?	Which methods promote consistent and integrated business process design in the course of a global ERP implementation?	* Methods for business process design focus on process-centric modeling, which does not support consistent and integrated design of business processes in alignment with business strategy and IT systems. * Despite its potential for supporting integrated design of an enterprise, EAM is perceived as being primarily IT-focused.	* What does EA mean? * How do organizations use EAM?

Table 3-1: Associations among principal research questions, practical and theoretical challenges, and research sub-questions

3.2.3.2 Description

The descriptive stage of the research process comprised the principal research activities for this thesis. To answer the descriptive and explanatory sub-questions derived from the practical and theoretical challenges, I conducted five studies, each comprising an extensive literature review and empirical research in the form of single or multiple case studies (chapter 4). Findings from these five studies developed understanding of business process design phenomena in MNCs (sections 4.1 and 4.2), described and explained how certain structures and mechanisms influence the design of business processes in MNCs, elaborated on BPM alignment and governance capabilities that could enable business process design (sections 4.3 and 4.4), and clarified the

concept of EA and suggested a taxonomy for the largely unknown EAM concept as a potential methodology for enabling integrated business process design in MNCs (section 4.5). These findings contributed to filling in some of the gaps in the extant theories identified in the course of the literature review.

The research activities conducted during the description stage were accompanied by my engagements in GEA. In the course of my work with GEA, in line with the three research questions of the study, I intended to develop an understanding of, and to support and improve business process design in the corporation based on my research and non-research activities. Therefore, I chose to decompose the description stage into three phases of understand, support, and improve. Table 3-2 presents the five research activities in the description stage along the three phases and my engagements in GEA. Table 3-3 provides a description of the case organizations studied in the course of this thesis.

	Engagement in GEA	Research activity	Research method	Research outcome
Understand	Establish understanding of process standardization and global ERP system implementations in MNCs	❶ Investigate factors influencing process standardization in MNCs	Single case study	Paper I
		❷ Investigate factors influencing ERP architecture in MNCs and implications of process standardization for ERP architecture	Four key informant interviews	Paper II
Support	Establish capability for alignment between process standardization and GEA's strategic and structural context	❸ Investigate alignment between process standardization and an MNC's international management strategy	Three case studies	Paper III
	Establish capability for BPG to manage business process design	❹ Investigate structure of BPG in MNCs and integration between BPM and IT management functions	Single case study	Paper IV
Improve	Establish capability for process modeling and EAM to enable integrated business process design	❺ Investigate different perceptions of EA and various applications of EAM in organizations	Eight case studies	Paper V

Table 3-2: Engagements in GEA and research activities

I became involved in GEA's global ERP implementation program right after program initiation; therefore the understanding phase of the description stage overlapped with defining the scope of the program and its approach. To support defining the program's scope, especially in terms of its approach toward BPM, the first phase of the description stage aimed at creating an understanding of global ERP systems and their interdependencies to business processes. To fulfill these objectives, I engaged in two tasks: identifying factors that could influence process standardization in GEA, and assessing the decision for single-instance global ERP implementation based on the feasibility of process standardization. To accomplish the first task, I conducted the first study of this thesis. I reviewed the literature on standardization, convergence, and transfer of business processes in organizations. I supplemented findings from the literature review with an analysis of process standardization in relation to GEA's contingencies and internal interviews that focused on the attitudes of business and IT representatives toward process standardization. The findings were internally reported to the program management team and were also presented at a conference as a single case study paper (paper I). Accomplishing the second task called for the second study of the thesis. I reviewed the academic and practitioner literature on various architectural scenarios for ERP systems in MNCs and the business and technical factors that in-

fluence the choice of ERP architecture. The focus was particularly on implications of process standardization for a single-instance global ERP architecture. Moreover, I conducted interviews with four key informants, all experienced in implementing single-instance global ERP systems. The findings were reported to program management and also presented and published as a conference paper (paper II).

In the support phase, I collaborated with GEA program management in developing BPM capabilities supporting business process design in the course of global ERP implementation. Findings from the understanding phase suggested a misalignment between process standardization and GEA's international management strategy. Therefore, the first activity in the support phase concerned developing guidelines for aligning process standardization with GEA's strategic and structural contexts. This also gave rise to the third study of the thesis. I studied the association between process standardization and an MNC's strategic and structural contexts in two external cases that had already implemented a global ERP system. The findings were reported to the program management team; however, it had limited effect on GEA's approach for deciding about process standardization. As predicted, GEA faced challenges defining and enforcing common process standards partly due to the misalignment between its international management strategy and process standardization. I synthesized my observations in GEA with findings from the other two case studies to develop a journal paper that explained the causal relationships between international management strategy and process standardization outcome in MNCs (paper III).

Findings from the understanding phase also suggested central governance for management of business processes to be an essential capability for enabling business process design in the course of a global ERP implementation. I collaborated in designing and establishing the BPM organization in GEA, which was first established as a temporary arrangement within the global ERP program and later as a permanent organization existing independently and separately from the global ERP program. To support developing the BPM function in GEA, I conducted the fourth study of this thesis and investigated the BPG structure and process mechanisms in an MNC with a long history in actively managing its business processes. I also used the case study to explore integration between BPM and IT management functions. Drawing on empirical findings from the single in-depth case study, I published a journal paper that argued for horizontal integration between BPM and IT management functions in support of business–IT alignment (paper IV). The paper offered a framework that proposed structural and process mechanisms enabling integration between BPM and IT management functions at the strategic and operational levels. I used the framework in GEA for developing integration between the newly established BPM function and the IT management function. To showcase the integration between BPM and IT management functions in support of strategic business–IT alignment, I adapted the strategy mapping approach and ran a series of six strategy mapping workshops at GEA.

In addition to my collaboration in planning and establishing the BPM function, I was also responsible for developing GEA's business process modeling capability. I was in charge of selecting and adapting the modeling standards and tools, training the business process managers in the standards, coordinating and supporting the process modeling activities, and reviewing the process models. The business process models supported the business process design activities by facilitating requirements engineering during business blueprinting. However, during the strategy mapping workshops, the process-centric models could not provide a holistic and integrated understanding of GEA for defining business and IT capabilities required to realize the business strategy. In addition, the global ERP program in GEA was accompanied with other IT implementation projects that interfaced with the ERP system. However, the process-centric models could not support providing an IT system-view of business processes and illustrating business processes with respect to IT systems' boundaries and interfaces. Therefore, the third stage of the study aimed at improving the methodology by deploying the EAM concept. To gain an understanding of EAM to better support establishment of the EAM concept and EA function in GEA, I conducted the fifth study and investigated the application of EAM in eight Danish organizations. The case studies led to the development of a taxonomy that suggested three classes of EAM applications based on three different perceptions of EA scope. These findings were presented in a

journal paper (paper V). Inspired by these findings, I was involved in introducing the concept of EAM in GEA in such a way as to support the integrated design of business capabilities and IT systems in alignment with business strategy. I was also involved in justifying and selecting the EAM tool. Subsequently, GEA established an EA function and appointed business and IT architects.

Case	Description	Study
1	Global supplier of engineering solutions to process industries	❶❷❸
2	Global producer of dairy products	❷❸❺
3	Global producer of industrial equipment	❸❹❺
4	Pension provider and investor	❺
5	Global apparel company	❺
6	Global producer of energy solutions	❺
7	Energy company	❺
8	Global engineering company	❺
9	Global provider of financial IT services	❺

Table 3-3: Case study overview

3.2.3.3 Prescription

In the last stage of this PhD study and in the context of writing this dissertation, I used the findings from the descriptive studies to answer the principal research questions. The answers to the research questions provide an understanding of the criticality of business process design in the course of a global ERP implementation and prescribe how this practice can be supported and improved by establishing BPM alignment, governance, and methodological capabilities (chapter 5). I formulate the prescriptive answers in response to the practical problems faced in GEA or identified through the literature review. In addition, each answer is formulated in such a way as to highlight its contribution to existing theories on BPM and business process design (section 5.1). As the answers to the three research questions are directly derived from the five studies conducted in the course of the descriptive stage, I argue for the validity of these answers based on validity of the five studies. In the final section of this chapter, I discuss the validity considerations I had conducting each of the five studies.

3.2.4 Research design

This section describes the research design of the five studies conducted in the course of this PhD study in terms of the research questions, unit of analysis, and data collection and analysis methods. Table 3-4 provides an overview of the research design for the five studies. I used the case studies for theory building, in both exploratory and complementary manners. Each of the five studies was designed in a way to answer the research questions that explicitly or implicitly addressed “why” and “how” in unexplored or unexplained research areas identified through the literature review.

Planning the case studies, I adopted both single- and multiple-case designs. The first and fourth studies were designed as single-case studies. The rationale for adopting a single-case design was the cases’ nature: both cases were assumed to be typical. The process standardization effort investigated in the first study was perceived as a typical business consolidation project conducted during the global ERP implementation in an MNC. The case was used to probe and complement the findings from the literature review that identified and explained the factors influencing process standardization efforts in MNCs. The case investigated in the fourth study was also a typical case representing MNCs with a centralized, mature, distinct BPG and ITG arrangements, and a reactive IT function. The case was used to confirm and complement predefined propositions and

further explore the collaboration between BPM and IT management functions. In addition, the fourth case represented a critical case, because if the findings from this single case could illustrate collaboration between BPM and IT management functions, then the study would indicate the necessity of integration between BPG and ITG frameworks, which was neglected in the earlier BPG and ITG studies. Both cases were information chosen, that is, I selected them based on prior knowledge of their potential and suitability for studying the phenomenon of interest.

I adopted a multiple-case study approach for the third and fifth studies. The rationale behind the multiple-case design was derived from prior theorizing of different settings and outcomes and the desire to have cases covering each type. Therefore, I selected diverse cases, i.e., cases that exemplified diverse values along a particular dimension (Seawright and Gerring, 2008). The three MNCs in the third study were selected due to their diverse structural characteristics so that they could fill predefined theoretical categories that explained the process standardization outcome based on an MNC's strategic and structural context. They were identical in terms of their country-of-origin and global ERP architecture and vendor to control for the impact of these factors on process standardization outcome. Similarly, in the fifth study, I based case selection on the three EA archetypes derived from the literature analysis. I selected eight cases that differed in their EAM applications so as to evaluate the proposed EAM taxonomy and further explore different deployments of EAM in organizations. I controlled for potential variation in approach toward EAM linked to size or cultural differences by focusing only on large Danish corporations. The second study used key informant interviews to assess and complement propositions explaining how process standardization could influence the choice of ERP architecture in MNCs. Although this study was not a direct case study, the interviews aimed at comparing informants' diverse experiences with process standardization in different organizations and how process standardization influenced ERP architecture in those cases.

I used semi-structured interviews, archival data, and direct observations as data collection methods. Semi-structured interviews were selected as the primary mode of data collection to enable a targeted focus on the case studies' topic (Yin, 2009). Semi-structured in-depth interviews could also support providing the background and contextual material for my exploratory and explanatory studies (Saunders et al., 2012). While at the beginning of each study, the interviews typically had an open-ended nature, towards the end of the study the interviews became more focused to corroborate the facts that I believed had already been established. Follow-up questions occasionally supplemented the interviews to resolve ambiguities and inconsistencies. I used archival documents to supplement and confirm data from the interviews. However, while at GEA I had been granted access to the organization's records, my access to such documents was restricted in other cases. Therefore, I had to be specific in my requests for documents and scripted information. My engagement in GEA also provided me with the opportunity to use direct observation as a mode of data collection for those studies where GEA was the subject of investigation. The engagement in GEA enabled me to perceive the reality from an insider point of view, comprehend the context, understand problems being encountered, and uncover the structure behind the experiences.

In all five studies, the strategy for data analysis relied on the theoretical propositions. I traced the propositions within or across cases. In the first study, the empirical data was coded according to the factors identified during the literature review and matched against the explanatory propositions. Similarly, I coded and analyzed the interview data in the second study based on the predefined propositions explaining the impact of process standardization on the choice of ERP architecture in MNCs. Data analysis in the third study was carried out in two stages according to the pattern-matching approach (Yin, 2009). The first stage of the data analysis aimed at assessing whether the evidence for each case was internally valid and supported the pre-specified propositions. I used each case to test the sufficient condition, that is, the outcome of process standardization efforts in the presence of a particular international management strategy. In the second stage of data analysis, I performed an overall assessment to determine whether the data across the cases provided sufficient evidence to support the propositions. As the cases represented diverse cases, I used the cross-case analysis to test the necessary condition, namely the outcome of process standardization effort in the absence of a particular international manage-

ment strategy. In this study, I not only relied on the theoretical propositions for data analysis but complemented this strategy with defining and testing rival theories that could explain a certain outcome of process standardization. The rival explanations were identified prior to data collection, so that I could gather evidence regarding their plausibility during data collection.

In the fourth study, the analysis of empirical data was conducted in three stages. First, I aggregated the interview transcripts and archival sources to a set of narratives that described governance of BPM and IT management in the case organization. The narratives showed support for one of the propositions. In the second stage, I coded the case data according to the grounded theory approach (Corbin and Strauss, 2008) and identified the properties of integration between BPM and IT management functions. In the third stage of data analysis, I sought the contextual factors that explained variations in the integration properties. I used these findings to develop a model that explained the strategic and operational integration between BPM and IT management functions based on the role of IT.

In the fifth study, the data analysis was carried out in three stages. In the first stage of analysis, to make sense of diverse perspectives on EA meaning and EAM applications, I analyzed and coded more than 80 papers that were retrieved through a structured literature search. This analysis led to the emergence of a taxonomy that classified EAM applications according to three notions of EA scopes. I then examined and refined the taxonomy through eight case studies. In the second stage of data analysis, within-case analysis was conducted by coding the interview transcripts and supplemental documents. When analyzing the data, I took a middle position between grounded theory and theory-determined coding (Dey, 1993). Although I used the pre-specified theoretical codebook in analyzing the three cases, the coding of the empirical data also aimed at allowing for new insights to emerge. In the third stage of data analysis, following Eisenhardt's (1989) suggestion, I compared the cases in pairs based on the concepts that emerged during within-case analysis. This analysis identified new subtle similarities and differences between cases that helped enhancing the proposed taxonomy.

	Research question	Unit of analysis	Data collection	Data analysis
❶	* What are the factors and conditions that influence process standardization in an MNC in the course of a global ERP implementation?	Process standardization in the course of the global ERP implementation in a single case.	* Eight semi-structured interviews * Archival documents * Direct observations	The empirical data were coded based on factors identified through the literature review and were matched against the explanatory propositions.
❷	* How does standardization of business processes and data structure across an MNC influence the choice of ERP architecture?	Global ERP system. The interviews served as the pilot study for a multiple-case study that was designed to investigate associations between process standardization and ERP architecture in three diverse MNCs. However, this pilot study suggested a shift in the research focus towards governance.	* Four key informant interviews	The interview data were analyzed and compared to propositions derived from the literature analysis.
❸	* How does an MNC's international management strategy affect process standardization in the context of a global ERP implementation?	Process standardization in the context of global ERP implementation programs in three Danish-headquartered MNCs, all with a single-instance, single-client ERP architecture. The cases were theoretically selected and represent diverse cases in terms of international management strategy and structural characteristics.	* Twenty-one semi-structured interviews * Archival documents * Direct observations	Dependent-variable, pattern-matching approach was applied for within- and cross-case analysis. In the first stage, the sufficient condition was tested to assess whether each case supported one of the propositions. In the second stage, findings across diverse cases were used to test the necessary condition. Data analysis was complemented with testing rival explanations.
❹	* How is BPM function structured in MNCs? * Why and how do BPM and IT management functions collaborate?	BPM and IT management functions in a single case. The case organization is information-chosen and typical, exemplifying MNCs with centralized, mature, and distinct BPG and ITG arrangements, where IT plays a reactive role.	* Nine semi-structured interviews * Archival documents	Data analysis was conducted in three stages. In the first stage a narrative was developed that showed support for one of the propositions. In the second and third stages, the case data were coded according to the grounded theory approach. Concepts that emerged were used to conceptualize integration between BPM and IT management functions.
❺	* What does EA mean? * How do organizations use EAM?	EA function in eight large Danish cases. The cases were theory-chosen, representing three notions of EA scope identified through the literature synthesis.	* Fourteen semi-structured interviews * Archival documents * Two conferences where three of the case organizations presented their EA function	Data analysis was conducted in three stages. First, retrieved papers were coded based on perception of EA and EAM application. Second, the eight cases were analyzed separately based on a middle position between grounded-theory and theory-determined coding. Third, cross-case analysis was conducted based on pair-wise comparison of cases according to concepts that emerged during within-case analysis.

Table 3-4: Research design of the five studies

3.2.5 Research validity

Four tests are commonly used to establish the quality of any empirical research: internal validity, construct validity, external validity, and reliability (Yin, 2009). In this subsection, I present an assessment of the rigor of the case study research conducted in this PhD thesis by discussing the validity and reliability criteria.

Internal validity is concerned with whether the researcher provides a plausible causal argument and logical reasoning that is powerful and compelling enough to defend the research conclusions (Gibbert et al., 2008). As internal validity is only a concern for causal case studies (Yin, 2009), it was especially important in the first, third, and fourth studies. As suggested by Yin (2009), I addressed the internal validity in the first and third studies through pattern matching. However, in the first study I only tentatively examined the sufficient condition, namely the outcome of process standardization efforts in the presence of particular contextual factors through secondary data and a case study. Internal validity could have been improved by conducting more case studies, especially cases that represented diverse contexts. I was more thorough with examining the sufficient and necessary conditions in the third study where I investigated the outcome of process standardization for the three cases in the presence and absence of a particular international management strategy. In addition, in the third study, I further enhanced internal validity by addressing an important rival explanation for the process standardization outcome, namely institutional distance across the subsidiaries (Gibbert et al., 2008; Yin, 2009). I further improved the internal validity in this study by theory triangulation (Gibbert et al., 2008). I used the institutional and resource dependency theories to explain the dominance of structural context over institutional context for process standardization. In the fourth study, the causal relationships between IT role and direction of integration between BPM and IT management functions were not the pre-specified propositions of this study and were suggested first after the exploratory case study. To strengthen internal validity, in this study I reviewed the extant literature and compared the propositions with the existing theories.

Construct validity refers to the quality of conceptualization or operationalization of the concepts being studied (Gibbert et al., 2008; Yin, 2009). In other words, construct validity is concerned with the extent to which a study investigates what it claims to investigate, that is, the extent to which a procedure leads to an accurate observation of reality (Gibbert et al., 2008). Yin (2009) suggests three tactics for improving construct validity: using multiple sources of evidence, establishing a chain of evidence, and having the case study report reviewed by key informants. Interviews were the main mode of data collection in the five studies presented in this thesis. However, as interviews are subject to bias, poor recall, and inaccurate articulation, I relied on the synergistic effects of triangulation to improve confidence in data quality and at the same time enhance construct validity. I implemented triangulation by using different data collection strategies and different data sources. I corroborated the interview data with information from other sources, especially archival documents. I also selected the interviewees from various hierarchical levels and organizational functions to manage the response bias and to enable viewing the phenomenon of interest from diverse perspectives (Eisenhardt and Graebner, 2007). To reduce bias in interview questions, I discussed the interview guide and questions with the co-authors prior to each round of interviews. As I was the only researcher in the field, the study could not make use of convergent observations of researchers to enhance confidence in the findings (Eisenhardt and Graebner, 2007). However, during the data analysis stages, the co-authors reviewed and commented on the codes and memos that enabled bringing a different eye to the evidence. In addition, to enhance credibility and confidence in findings, I shared and discussed my understandings and the narratives with the interviewees when possible. This reflexive elaboration not only provided the opportunity to confirm my understanding, but also provided the opportunity for deeper and richer analysis (Tracy, 2010).

External validity deals with whether the study's findings are generalizable beyond the immediate case study (Yin, 2009). As cases are not sampling units, but almost equivalent to experiments, it is not possible to statistically generalize case findings to the population from which the cases were drawn (Tsang, 2014; Yin, 2009). Case studies rely on theoretical generalization,

where a particular set of results is generalized to some broader theory (Yin, 2009), which under critical realism consists of postulated structures and mechanisms operating in the real domain (Tsang, 2014). Researchers make theoretical generalizations by developing explanations of relationships between variables observed in case studies with the belief that the generative mechanisms or structures that caused the observable events in a case setting will also cause similar outcomes in other settings (Tsang, 2014). By pursuing replication logic, multiple case studies provide a stronger basis for theoretical generalization; however, a single case can still be used as the basis for developing theory beyond the case if a rigorous and defensible explanation has been produced (Tsang, 2014; Yin, 2009).

The first two studies were conducted during the initial sense-making effort, and the findings and conclusions of these two studies were predominantly based on extensive literature reviews. Therefore, my argument for the generalizability of conceptual models developed in the course of these two studies relied on the fact that these models were derived from already well-established theories. In addition, the conceptual models were tentatively tested through empirical studies, which further contributed to the external validity of the models. In the fourth study, I aimed for analytical generalization (Yin, 2009). The theory was developed by recognizing relationships among the constructs within the single case and their underlying logical arguments. In this understanding, the validity of the proposed theory did not depend on the representativeness of the case in a statistical sense, but on the plausibility of the logical reasoning (Walsham, 1993). However, as the case was representative of MNCs in which IT plays a reactive role, further case studies in MNCs where IT plays a different role are required to assess the validity of the findings. In the third and fifth studies, I sought theoretical replication by studying the proposed theory in diverse cases (Yin, 2009). In the fifth study, the theoretical replication was complemented with literal replication (Yin, 2009) as the study covered more than one case in each theoretical group. In addition, to establish boundaries for generalizability of the findings and to specify the cases' representativeness, the third, fourth, and fifth studies precisely specified which types of organizations the selected cases exemplified. This assisted with devising projections about transferability of the findings to other cases.

Reliability is concerned with transparency and replication, demonstrating that the research operations can be repeated with the same results (Gibbert et al., 2008; Yin, 2009). Yin (2009) recommends the use of a case study protocol and establishing a case study database as tactics for approaching reliability. For each of the five studies, a case study protocol was devised that incorporated the data collection procedure in terms of interviewees' names, interview plans, and documents to be collected. The case study protocols also comprised the line of inquiry reflected in the interview guides that encompassed the principal themes and questions to be covered during the interviews. The interview guide was included in the papers whenever it was requested. All interviews were recorded and transcripts added to a case study database along with other documents such as archival documents, occasionally field notes, case study analysis, and relevant literature. However, because of the confidentiality agreements with the case organizations, I could not share the databases publicly. Still, in case of request, the research papers included the literature list and representative quotations from the interviews. Furthermore, some of the papers elaborated on the coding procedure by presenting the codebook or the concepts that emerged during open and axial coding.

3.3 Chapter summary

Chapter 3 elaborated on the scientific approach and methodology of the PhD study. First, it discussed the philosophical grounding of the study and argued for the choice of critical realism based on my personal belief system, subjects of the study, and objectives of the research. Second, it described the specific type of engaged scholarship deployed in this study and defended the choice of case study methodology grounded on support for critical realism and the research purpose. Third, it explained the research processes divided into three stages of clarification, description, and prescription. It further elaborated on the descriptive stage of the study and the research activities conducted along with my engagements in GEA in support of understanding,

supporting, and improving business process design. Fourth, it described the research design of the five studies conducted in the course of the PhD project. And fifth, it concluded with a discussion on the validity of the five studies in terms of internal validity, external validity, construct validity, and reliability.

4 RESEARCH SUMMARY

This chapter provides a summary of the research papers developed in the course of this PhD study. As shown in Table 4-1, this PhD study ended up with a total of three conference papers and three journal papers. This chapter presents a summary of five of these papers. To avoid redundancy, I do not present the third paper in the list as Paper IV is an extension of this conference paper in a journal format.

No.	Publication
Paper I	Rahimi, F., and Møller, C. Global ERP implementations and harmonization of practices in multinational corporations. *19th Americas Conference on Information Systems, AMCIS 2013.* Association for Information Systems, 2013.
Paper II	Rahimi, F., and Møller, C. Level of harmonization and ERP architecture in multinational corporations. *24th Australasian Conference on Information Systems (ACIS)*. RMIT University, 2013.
—	Rahimi, F.,Møller, C., and Hvam, L. Alignment between business process governance and IT governance. *20th Americas Conference on Information Systems, AMCIS 2014.* Association for Information Systems, 2014.
Paper III	Rahimi, F., Møller, C., and Hvam, L. Succeeding in process standardization: Explaining the fit with international management strategy. *Business Process Management Journal* 22.6 (2016).
Paper IV	Rahimi, F., and Møller, C., and Hvam, L. Business process management and IT management: The missing integration. *International Journal of Information Management* 36.1 (2016): 142–154.
Paper V	Rahimi, F., Gøtze, J., and Møller, C. Enterprise Architecture Management: Toward a Taxonomy of Applications. Submitted for the second round of review.

Table 4-1: Overview of publications

The next five sections present the five papers in terms of their research objectives, findings, contributions to theory, and implications for the principal research questions of this PhD thesis. The chapter concludes with a summary of the descriptive research conducted in the course of this PhD study.

4.1 Paper I: Global ERP Implementations and Harmonization of Practices in Multinational Corporations: A Conceptual Framework

Authors: Fatemeh Rahimi, Charles Møller

Published in: *Proceedings of the 19th American Conference on Information Systems* (2013)

4.1.1 Research objective

Integration of business processes and data serves as an important motive for the implementation of global ERP systems in MNCs; however, global ERP systems do not automatically lead to integration. Common business processes and data standards are prerequisites for seamless transactions across an MNC's subsidiaries (Huber et al., 2000; Sethi et al., 2008). However, MNCs face difficulties reaching a global consensus on common process standards as conflicts often arise between local and corporate-wide requirements during process standardization (Holland and Light, 1999b). The objective of this study is to provide a comprehensive answer to the following question: what are the factors and conditions that influence business process design, in particular process standardization, in the course of a global ERP implementation in MNCs? As any given theory is an incomplete abstraction that cannot describe all aspects of a phenomenon (van de Ven, 2007), this study deploys multiple frames of reference and alternative theories to provide an understanding of the complex problem of standardizing business processes across an MNC. In this way, it servers the sense-making process and sets the basis for what to look for in the later studies.

The study is conducted in two stages. First, drawing on an extensive literature review, the study proposes a framework that incorporates the factors influential in process standardization in MNCs. The explanatory power of the framework is then tentatively tested using secondary data and a case study. The case study is conducted in an MNC in the process of developing its template for the rollout of a global ERP system.

4.1.2 Research findings

Factors influencing process standardization in MNCs

Although Levitt (1983) believes that the days of national and regional preferences are gone and that there is a convergence in commonality, there are differences in the way of doing business in MNCs. The organizational form and capabilities of an MNC are shaped by technical and economic rationality, constraints in resource allocation, cognitive orientation of managers, and social and institutional structure of environments (Ghoshal and Bartlett, 2010). Assuming the factors that influence process standardization to be a subset of factors that impact formalization, convergence, and transfer of processes across an MNC, the study reviews the social and economic theories to develop a framework that explains process standardization in MNCs. Figure 4-1 provides an overview of these factors and Table 4-2 presents a short description of these factors (Note: the classification of factors in this summary is different from the original paper. I also chose to omit the factors referring to knowledge stickiness along the different stages of a transfer process, as I believe knowledge stickiness is the outcome of the contingency factors' influence on the transfer process.) The secondary data and the case study tentatively verified the influence of factors specified in the framework on process standardization outcome in MNCs.

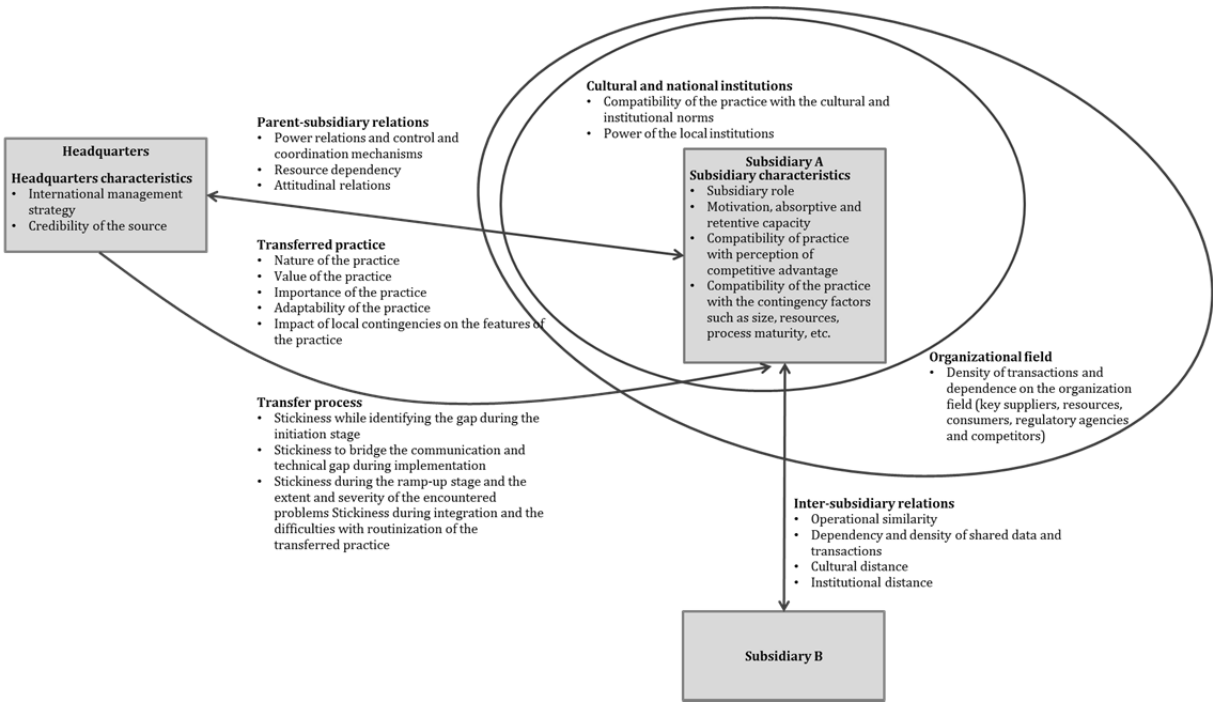

Figure 4-1: Framework of influential factors for process standardization in MNCs

	Factor	Description	References
Strategic and structural context	International management strategy	Isomorphism with local patterns is stronger in MNCs structured to meet the strategy for local responsiveness, whereas global integration strategy encourages adoption of common practices across subsidiaries to enable worldwide coordination and to exploit scale economies.	Bartlett and Ghoshal (1999), Cavusgil et al. (2004), Rosenzweig and Singh (1991)
	Resource dependency	In MNCs where subsidiaries exhibit a higher degree of interdependence with the headquarters and other subsidiaries, there is a more complete manifest of corporate features to gain legitimacy required to access resources. In MNCs where subsidiaries are dependent on organizational field and local resources, isomorphism happens with local norms and standards. Interdependencies also justify the need for a common formalized language to reduce transaction costs.	Gattike and Goodhue (2004, 2005), Kostova (1999), Rosenzweig and Singh (1991), Westney (2010)
	Headquarters control over subsidiaries	A higher level of control from the headquarters increases potential for convergence and thus standardization of processes. Decentralized decision making increases the freedom for bottom-up development of local processes and adaptation to local norms.	Gamble (2010), Geppert and Williams (2006), Kostova (1999), Rosenzweig and Singh (1991)
	Inter-subsidiary operational similarity	Operational similarity and common products and process technologies suggest similar types of business processes, whereas process standardization across heterogeneous subsidiaries may result in either design or compromise costs.	Gattike and Goodhue (2004, 2005), Mueller (1994), Ross et al. (2006), Tregear (2010)
	Subsidiary role	The strategic importance of a subsidiary — caused by, e.g., local resources, complexity of the local environment, magnitude and direction of transactions, local competences — has implications for headquarters–subsidiary relationships. This may provide the subsidiary with the bargaining power to protect local processes and to resist the imposition of a centralized approach for global standardization.	Bartlett and Ghoshal (1986), Birkinshaw and Morrison (1995), Geppert and Williams (2006)

	Factor	Description	References
Institutional context	Cultural environment and institutions	Business processes vary across cultural environments. The cultural distance of a subsidiary negatively influences the success of transferring standardized processes. Cultural distance across an MNC also influences the choice of process standardization as a coordination mechanism. Business processes are influenced not only by local culture but by a wider range of coercive, cognitive, and normative institutions operating in the environment. The institutional distance of a subsidiary increases the likelihood of misalignment between the standardized process and the subsidiary's institutional environment, and negatively influences the success of transferring standardized processes.	Gamble (2010), Geppert and Williams (2006), Kostova (1999), Mueller (1994), Tempel and Walgenbach (2007), Rosenzweig and Singh (1991)
Relational context	Quality and type of relationship	The ease of communication and intimacy of the overall relationship between the headquarters and subsidiaries affect the number and outcome of attempts for transferring standardized processes from the headquarters to subsidiaries. Subsidiaries' commitment to, identity with, and trust in the headquarters positively impacts acceptance of standardized processes.	Kostova (1999), Szulanski (1996, 2006)
Organizational context	Motivation, absorptive and retentive capacity	The subsidiary's level of motivation to accept knowledge from the outside and its absorptive and retentive capacity influence its willingness to accept standardized processes, recognize their value, and institutionalize them.	Kostova (1999), Szulanski (1996, 2006)
Characteristics of the process	Variability	The degree of variability of a process influences its formalization and standardization potential, and consequently the success of any attempt to reduce its variations across an MNC.	Lillrank (2003), Rosenkranz et al.(2010)
	Value and local importance	Causal ambiguity and lack of proof regarding value of a standardized process negatively influence the success of its transfer to subsidiaries. Replacing local processes with standardized processes may damage competitiveness when local differences are due to unique commercial propositions, whereas it enhances performance when the local differences have only historical significance.	Leijen (2005), Kostova and Roth (2002), Szulanski (1996)
	Adaptability	The more context-specific a business process, the more difficult it is to apply the same process in the business context of another subsidiary. While non–location-bound, non-firm-specific processes can be exploited globally, location-bound, firm-specific processes can be exploited only in a particular location.	Andersson (2003), Leijen (2005), Rugman and Verbeke (1992), Rugman et al. (2011)

Table 4-2: Factors influencing process standardization in MNCs

4.1.3 Research contribution

Drawing on a literature review, the study proposes a framework that explains the heterogeneity of business processes across an MNC, caused by corporate strategic, institutional, relational, and organizational contexts and characteristics of the business process itself. The framework suggests that process standardization may better fit some MNCs compared to others. The strategic and structural contexts of an MNC and the institutional distance across its subsidiaries are im-

portant when assessing process standardization fitness in an MNC. Furthermore, subsidiaries' response to process standardization initiated by the headquarters may differ depending on their role in the corporation, their institutionalized norms and values, their organizational context, and their relational context to the headquarters. This may necessitate a differentiated approach for process standardization across corporate subsidiaries. Finally, the framework suggests that business processes differ from one another in terms of standardization potential. The variability of a business process, its value, and its compatibility with and adaptability to the subsidiaries' context influence its potential for standardization across an MNC. These factors may result in a hybrid outcome characterized by a mixture of globally standardized and locally adapted business processes. This study contributes to the existing body of knowledge in one important way:

- Previous BPM studies take a mechanistic view of business processes and encourage process standardization based on the similarity of business processes' structure, procedures, and outputs (e.g., Harmon, 2007; Ross et al., 2006). However, assuming that business processes are designed in rational and technical terms typically neglects human and organizational issues that affect process standardization and which are often referred to in ERP implementation studies. By viewing business processes not only as a machine for turning inputs to outputs but also as systems and social constructs, this study offers a more comprehensive understanding of strategic, institutional, relational, and organizational factors that differentiate business processes across subsidiaries and thus influence process standardization in MNCs.

4.1.4 Conclusion

By clarifying the various factors that differentiate business processes across the subsidiaries of an MNC, this study supports answering RQ1. The findings suggest that business process design in the course of a global ERP implementation, particularly when it comes to decision making for process standardization, should be in line with a wide range of factors. Business process standardization may be hindered by strategic and structural context of the MNC, multiplicity of institutional contexts across its subsidiaries, subsidiaries' cultural orientation towards learning, and their relationships and attitude towards the headquarters. This multi-perspective view of business processes suggests that a different view of business process design and change is required. Business processes should not be designed only based on technical terms, and business process design activities should encompass a process for negotiation of conflicting interests.

4.2 Paper II: Level of Harmonization and ERP Architecture in Multinational Corporations

Authors: Fatemeh Rahimi, Charles Møller

Published in: *Proceedings of the 24th Australian Conference on Information Systems* (2013)

4.2.1 Research objective

MNCs have a wide range of architectural choices for corporate ERP solutions. At one end is the completely decentralized architecture, in which the corporate ERP solution is distributed across several systems that work separately and independently from one another. At the other end is the centralized architecture that consists of a single system on which all corporate business processes and data are implemented (Davidenkoff and Werner, 2008). However, the popularity of corporate-spanning global ERP systems has grown among MNCs in line with the IT centralization trend, rapid changes in the communication technology, and significant maturity of ERP hardware, software, and databases (Carton and Adam, 2003; Ghosh, 2003; Phelan, 2011). Streamlining business processes and improving the flow of information across subsidiaries serve as important motives for implementing global ERP systems in MNCs. However, as indicated in paper I, strategic, institutional, organizational, and relational contexts of an MNC may negatively influence process standardization in the course of a global ERP implementation. This study takes a critical view to the implementation of single-instance ERP systems in MNCs and investigates the factors that influence ERP distribution decisions. The study particularly examines the implications of process standardization for the choice of ERP architecture. In this quest, the study asks and answers one question: How does standardization of business processes and data structure across an MNC influence the choice of ERP architecture?

The study is conducted in two stages. First, a review of both academic and practitioner literature identifies the factors influential in ERP distribution decisions in MNCs. Second, by interviewing four key informants, the study empirically examines the identified factors and in particular investigates the impact of process standardization on ERP architecture. The key informants were selected from among IT professionals with experience in single-instance ERP implementations in MNCs.

4.2.2 Research findings

Factors influencing ERP distribution decisions in MNCs

As illustrated in Table 4-3, the literature review identifies two groups of factors that influence global IT and particularly ERP distribution decisions in MNCs: business-related factors and technical system–related factors. While technical factors such as ERP system characteristics and infrastructural limitations are decisive for ERP distribution in MNCs, their influence has been diminished as a result of technological advances. Therefore, several studies suggest distribution decision making be based on business and not technical factors (e.g., Clemmons and Simon, 2001; Zrimsek and Prior, 2003).

On the subject of business-related factors, most studies emphasize the necessity for alignment between the ERP architecture and the MNC's strategic and structural contexts. A headquarters-driven centralized architecture better suits global MNCs intended for a high degree of process standardization for harvesting world-wide economies of scale. MNCs with autonomous subsidiaries that operate in multi-domestic industries implement a decentralized architecture to reflect domestic needs in terms of business processes and data standards. Operational similarity and resource interdependencies are other decisive factors for ERP architecture in MNCs. An underlying assumption in these premises is that a single-instance, global ERP system inevitably must be configured based on rigid rules and standards, and therefore its implementation in an MNC needs to be in line with the feasibility of process standardization. Other studies directly suggest

that process standardization is an important factor for justifying single-instance ERP implementation in MNCs. Cultural and institutional contexts are other factors influencing ERP distribution in MNCs.

Category	Factors	References
Business factors	International management strategy and corporate governance model	Clemmons and Simon (2001), Davenport (1998), Ives and Jarvenpaa (1991), Kay (1998), King (1983); Madapusi and D'Souza (2005), Markus et al. (2000), Rayner and Woods (2011)
	Operational similarity across subsidiaries	Gattiker and Goodhue (2004)
	Information requirements and interdependency between subsidiaries	Clemmons and Simon (2001), Gattiker and Goodhue (2004); Tractinsky and Jarvenpaa (1995)
	Degree of commonality of business processes across subsidiaries	Davenport (1998), Ghosh (2002), Ives and Jarvenpaa (1991), Rayner and Woods (2011)
	Diversity of national culture and legislation related to data processing and trans-border data flow	Sheu et al. (2004); Stephens (1999), Tractinsky and Jarvenpaa (1995)
Technical factors	Support for multiple languages, time zones, add-ons, industry solutions, and country versions	Davidenkoff and Werner (2008), Ghosh (2003), Zrimsek and Prior (2003)
	Server sizing, storage capabilities, network requirements, and backup and systems maintenance planning	Ghosh (2003), Kay (1998), Zrimsek and Prior (2003)

Table 4-3: Factors influencing ERP distribution decision in MNCs

Implications of process standardization for single-instance ERP in MNCs

The research on global IT systems and ERP architecture explicitly or implicitly suggests process standardization as a decisive factor for ERP distribution in MNCs. Therefore, the study further investigates the implication of process standardization for a single-instance ERP implementation in MNCs.

Several studies suggest that the real benefits of an ERP consolidation become apparent only after process standardization as a solely technical standardization leads to a highly complex system (e.g., Hufgard and Gerhardt, 2011). Technical tight coupling increases the risk of system downtime and outage; necessitates complex planning for upgrades, backups, and maintenance; increases problem identification and resolution time; and reduces business agility due to greater change control (Ghosh, 2003; Hanseth et al., 2001; Hufgard and Gerhardt, 2011; Kay, 1998; Markus et al., 2000; Seethamraju, 2009; Zrimsek and Prior, 2003). Process standardization moderates the complexities of technical integration by reducing variations in the overall solution. The literature analysis indicates that lack of process standardization negatively impacts single-instance global ERP systems in two ways. First, as the level of localization in a global ERP system increases, there will be more difficulties in information sharing and thus less support for control and coordination of global operations (Carton and Adam, 2003; Hawking et al., 2007). Common business processes and data standards are the necessary prerequisites for deploying a single-instance ERP system as an integrative mechanism in MNCs. Second, accommodating diversified process and data standards within a single system increases total cost of system ownership as a result of higher costs for system configuration, maintenance, and support, and greater investments in customized integration codes (Hufgard and Gerhardt, 2011; Madapusi and D'Souza, 2005). Summarizing these findings, Figure 4-2 suggests process standardization to moderate the

relationship between ERP architecture and its support for control and coordination and system total cost of ownership.

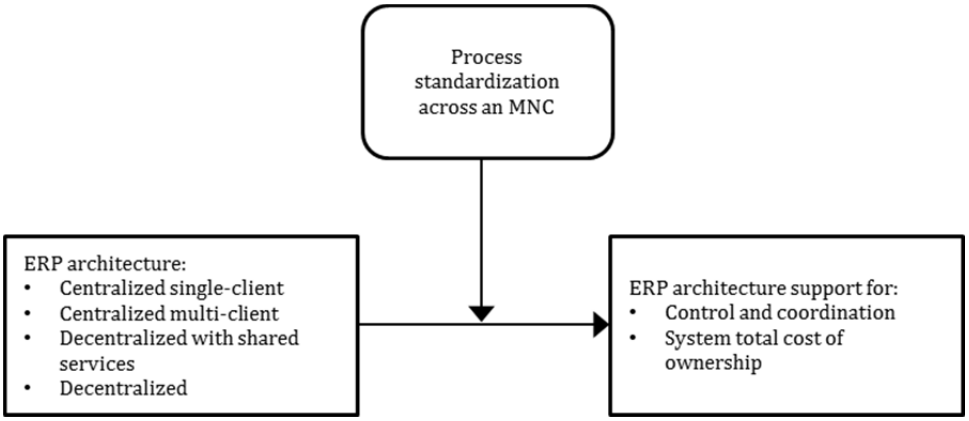

Figure 4-2: Relationship between ERP architecture and its benefits mediated by process standardization

Business process governance and IT governance decisive for ERP architecture

After the literature review, the study empirically investigates ERP distribution decisions in MNCs through key informant interviews. The informants confirm the moderating impact of process standardization on a single-instance global ERP system's support for control and coordination and its total cost of ownership. Furthermore, the informants highlight the negative impact of lack of process standardization on system user friendliness.

However, the key informants reject a direct relationship between process standardization and ERP distribution decision making in MNCs. Although identical configuration of system-level features is inevitable in a single-instance global ERP system, the informants argue that a single-instance ERP system may still be configured to considerably accommodate different requirements across an MNC's subsidiaries. Therefore, a global ERP implementation does not enforce a high level of process standardization. However, lack of process standardization may be a burden when deploying a single-instance ERP system if it indicates distributed governance for management and design of business processes across the MNC. This is because decentralized governance increases the likelihood of divergent process and data standards to a point where it is not possible to accommodate all variations in a single system. Therefore, the key informants suggest the need for central governance in managing business processes to ensure central decision making with respect to business process design during ERP system implementation and operation. Central governance prohibits disagreements on ERP system configuration and unmanageable divergence of process and data standards. In addition, the key informants highlighted the necessity of central governance for IT management to ensure central decision making for ERP administration. In other words, while lack of process standardization negatively influences the benefits of a single-instance ERP system in an MNC, the choice of ERP architecture depends largely on the MNC's business process and IT governance models.

4.2.3 Research contribution

Practices exercised in MNCs increasingly favor implementation of a single-instance global ERP system due to its potential for IT cost savings and business consolidation benefits. This study takes a critical view to this approach and investigates technical and business factors decisive for ERP distribution in MNCs, and particularly the implications of process standardization for ERP architecture. The findings indicate the moderating impact of process standardization on a single-instance global ERP system's total cost of ownership and its support for control and coordination across an MNC. However, the empirical findings suggest that an MNC's governance model for managing business processes and IT systems — and not necessarily process standardization

— is critical for ERP distribution in MNCs. Drawing on these findings, the study has two theoretical implications:

- This study emphasizes the need for alignment between ERP distribution decision and an MNC's governance model for management of business processes and IT systems; however the findings do not indicate the necessity of alignment between ERP architecture and process standardization. In line with some previous studies (e.g., Davidenkoff and Werner, 2008; Hufgard and Gerhardt, 2011), empirical findings suggest that a single-instance global ERP system may be configured to considerably accommodate differentiated requirements in each MNC subsidiary. Therefore, this study challenges some previous studies that suggest a direct relationship between the ERP distribution decision and degree of commonality of process and data standards across an MNC (e.g., Gosh, 2002; Madapusi and D'Souza, 2005).

- While the empirical findings do not support a direct relationship between ERP distribution and process standardization, they indicate the negative impact of lack of process standardization on a global ERP system's total cost of ownership and its support for control and coordination. Therefore, the findings confirm previous studies that suggest a higher level of commonality in business processes to better justify the choice of single-instance ERP architecture in MNCs (e.g., Davenport, 1998; Ives and Jarvenpaa, 1991; Rayner and Woods, 2011).

4.2.4 Conclusion

By clarifying the implications of process standardization for choosing ERP architecture and its benefits, this study provides an answer to RQ1 of this PhD study. The findings suggest that a single-instance global ERP system may be considerably configured to accommodate different requirements in each subsidiary. However, as lack of process standardization negatively influences total cost of system ownership and its deployment as an integrative mechanism, this study suggests that the bias should be in favor of process standardization. Furthermore, this study contributes to answering RQ2 by proposing central governance for managing business processes and IT systems as capabilities supporting business process design during a global ERP implementation. While the central ITG ensures central decision making for system administration, the central BPG prohibits divergence of process and data standards to a point where it is not possible to accommodate them within a single ERP system.

4.3 Paper III: Succeeding in Process Standardization: Explaining the Fit with International Management Strategy

Authors: Fatemeh Rahimi, Charles Møller, Lars Hvam

Forthcoming in: *Business Process Management Journal,* 22.6 (2016)

4.3.1 Research objective

As discussed in paper II, although integration serves as an important motive for implementing single-instance global ERP systems in MNCs, global ERP implementations do not automatically lead to integration. Common business processes and data standards are prerequisites for seamless transactions and information exchange across an MNC. However, as indicated in paper I, conflicts often arise between local and enterprise-wide requirements during process standardization. Paper I further suggests alignment with the strategic and structural context decisive for resolving universality–individuality and efficiency–flexibility dilemmas when unifying process standards across an MNC. Several studies, including Clemmons and Simon (2001), Ives and Jarvenpaa (1991), Karimi and Konsynski (1991), and Madapusi and D'Souza (2005) emphasize the necessity of fit between ERP architecture and corporate strategy for global integration and local responsiveness. However, these studies only implicitly discuss process standardization. In addition, these studies only partially address the issue of causality. To address this gap, the current study asks and answers a single question: How does an MNC's international management strategy affect process standardization in the context of a global ERP implementation?

The study answers the question in three stages. First, drawing on a literature review, we explain the impact of a particular international management strategy on an MNC's structural characteristics and then assess the compatibility between structural characteristics and process standardization as a centralizing coordination mechanism. This analysis gives rise to two propositions that argue process standardization in the course of a global ERP implementation is a better fit, and thus is likely to be more successful, in MNCs structured for global integration compared to those designed for local responsiveness. Second, the study empirically examines the propositions by studying three cases that have experienced process standardization in the course of a global ERP implementation but vary in their strategic focus and therefore structural context. Third, using the propositions and empirical findings, the study proposes a framework and develops conditions of fit between structural elements characterizing an MNC's international management strategy and process standardization.

4.3.2 Research findings

MNC's international management strategy decisive for process standardization

Bartlett and Ghoshal (1999) and Prahalad and Doz (1999) categorize international management strategy in MNCs into global integration and local responsiveness. An MNC's international management strategy is devised along two structural dimensions: configuration of assets and headquarters–subsidiary relationships. While global integration strategy aims at maximizing corporate efficiency by global deployment of resources and central management of activities, local responsiveness strategy pursues context-sensitive decisions taken by self-contained subsidiaries. Considering process standardization to be a centralizing coordination mechanism and drawing on contingency theory, the study argues for the necessity of fit between process standardization in the context of a global ERP implementation and the MNC's international management strategy. As illustrated in Figure 4-3 and described in the following propositions, the study discusses the fit by raising the issue of causality, that is, by investigating how international management strategy and consequent structural characteristics affect process standardization and lead to a certain outcome for such efforts.

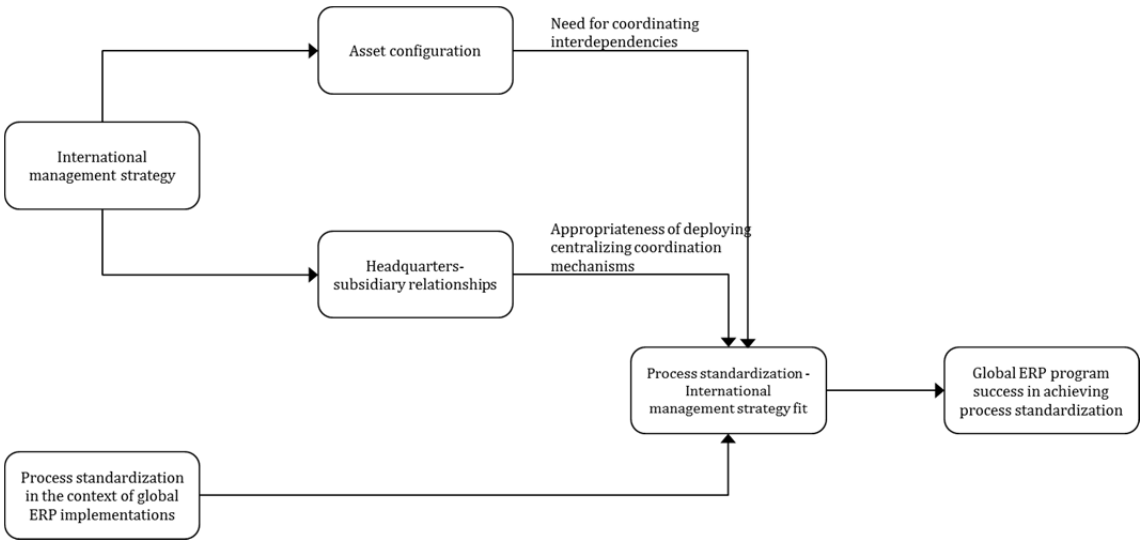

Figure 4-3: Fit between process standardization and international management strategy

Proposition 1: Process standardization in the context of a global ERP implementation has a higher degree of fit with MNCs pursuing a global integration strategy, in which process standardization coordinates interdependencies in the functional structure and does not disturb the operational control relationship between the headquarters and subsidiaries. This is likely to have a positive impact on process standardization success during the global ERP implementation.

Proposition 2: Process standardization in the context of global ERP implementation has a lower degree of fit with MNCs pursuing a local responsiveness strategy, in which process standardization disturbs the financial control relationship between headquarters and subsidiaries and is less required for coordination as subsidiaries contain most of the necessary coordination mechanisms. This is likely to have a negative impact on process standardization success during the global ERP implementation.

The study then examines the two propositions using three case studies that represented diverse asset configurations and headquarters–subsidiary relationships. As illustrated in Figure 4-4, the three case studies, analyzed separately and together, support the sufficient and necessary conditions for assessing the propositions. While in Beta, the powerful headquarters managed to enforce process standardization to facilitate central management of activities and interdependencies across the functionally structured business units, Alpha experienced difficulties enforcing the common process standards on its self-sufficient autonomous divisions. In addition, in Alpha lack of permanent governance for management of business processes increased their divergence after the global ERP program ended. In Gamma, efforts to implement process standardization in support of inter-organizational resource dependencies were resisted by the autonomous business units. The process standardization initiative received momentum only after the corporation transformed its governance model to a centralized structure. Despite the differences across cases in terms of achievable degree of process standardization, they all implemented a single-instance ERP system from the same vendor.

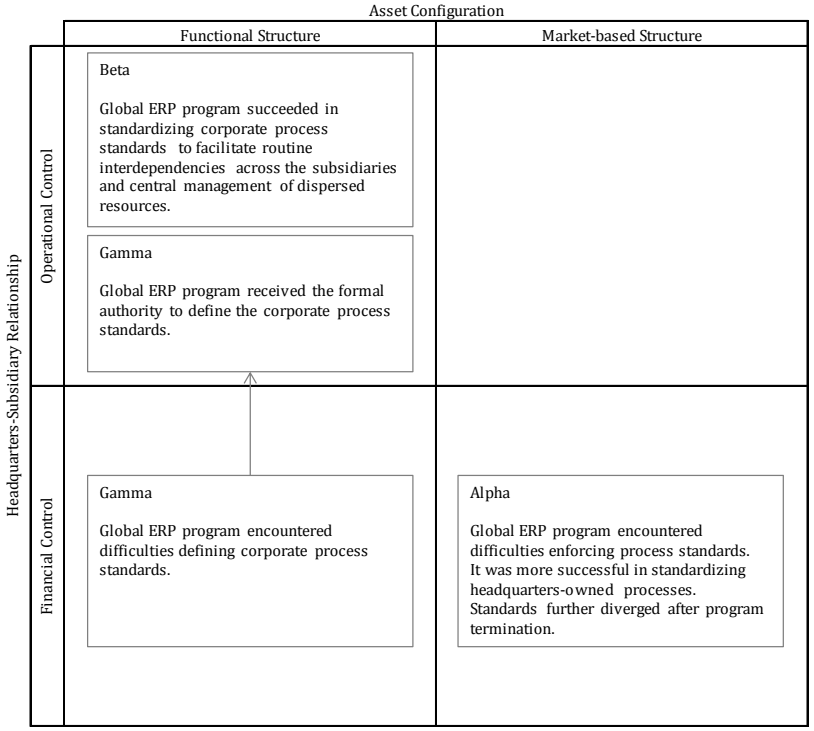

Figure 4-4: Process standardization outcomes in relation to structural characteristics of cases

Conditions of fit between process standardization and MNCs' structural characteristics

Drawing on the propositions and empirical findings, the study proposes a framework that suggests conditions of fit between process standardization and structural elements characterizing MNCs' international management strategy. The framework is presented in Figure 4-5.

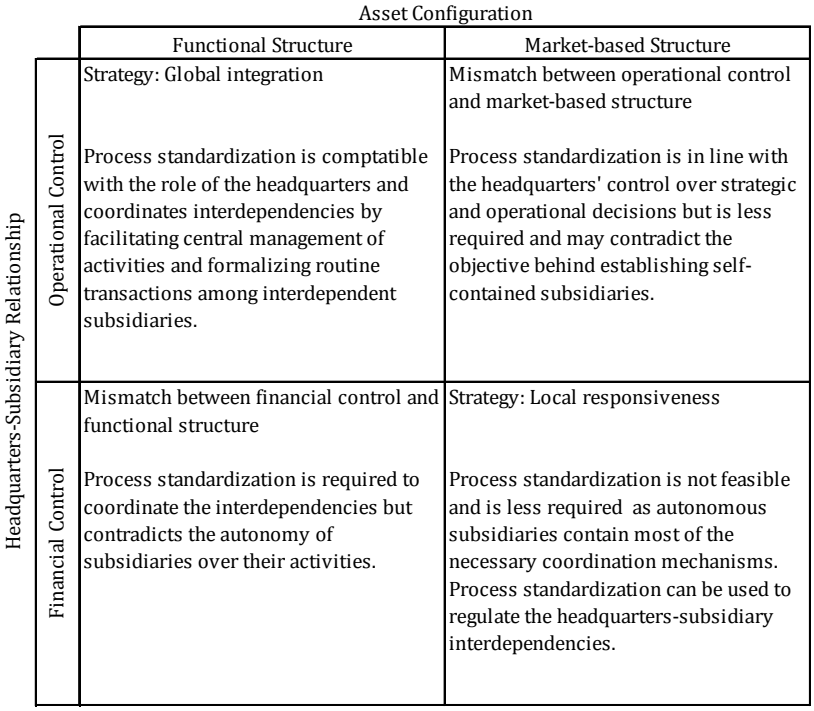

Figure 4-5: Fit between MNCs' structural characteristics and process standardization

Process standardization as a centralizing coordination mechanism better fits MNCs structured for global integration; consequently, global ERP programs in such MNCs are more likely to succeed in unifying process standards across subsidiaries. In MNCs pursuing global integration, the need for worldwide coordination encourages adoption of common processes across subsidiar-

ies. Process standardization not only formalizes routine interdependencies across specialized subsidiaries, but also facilitates central management and action planning of dispersed resources and distributed activities. In such MNCs, the headquarters' role and its authority for managing the interdependencies allow for defining and imposing common business processes.

Process standardization is less appropriate in MNCs structured for local responsiveness; therefore global ERP programs in such MNCs have a lower probability of succeeding in process standardization. The market-based structure diminishes the need for deploying process standardization for coordination, and the headquarters' limited financial control over the subsidiaries, which allows for strengthening local presence, contradicts the centralizing nature of process standardization. Process standardization in such MNCs may damage competitiveness especially when local differences are due to unique commercial propositions. Therefore, in such MNCs, the scope of process standardization may be limited to regulating the headquarters–subsidiary interdependencies.

According to Bartlett and Ghoshal's (1999) classification of MNC structure, in MNCs where the headquarters' role is limited to financial controller despite interdependencies across the subsidiaries, there is, indeed, a mismatch between the configuration of assets and the headquarters' role. Such MNCs will better succeed when deploying process standardization for coordination if they intend to centralize the corporate governance model, at least in areas that require global integration. The mismatch is also present in MNCs where the subsidiaries are self-contained but the headquarters has operational control over subsidiaries. In such MNCs process standardization better fits areas in which the MNC deliberately intends to concentrate assets or decision-making authority.

4.3.3 Research contribution

Drawing on findings from a literature review and three case studies, this study explains how an MNC's international management strategy and consequent structural characteristics affect process standardization in the context of a global ERP implementation. Our findings propose that process standardization better fits the functional structure and operational control found in MNCs pursuing global integration, whereas it is less required and disturbs financial control in MNCs seeking local responsiveness. By explicating conditions of fit between process standardization and MNCs' structural elements, the framework assists managers to consciously decide about process standardization based on their corporate structural context. The findings also have three theoretical implications:

- Several studies advocate process standardization in MNCs in which the subsidiaries are operationally comparable (e.g., Harmon, 2007; Ross et al., 2006). While asserting operational similarity as a driver for process standardization, this study argues that a standardized business process is a centralizing coordination mechanism and therefore its deployment in an MNC also needs to be in line with corporate strategic and structural contexts.

- This study suggests that process standardization in the course of a global ERP implementation not only increases the level of centralization in an MNC (Mintzberg, 1993), but also that achieving common process standards requires central governance to be in place, especially for managing business processes. Therefore, the study not only acknowledges the positive impact of BPM for successful implementation of ERP systems (e.g., Žabjek et al., 2009), it argues that permanent central governance for managing business processes is the prerequisite for developing, imposing, and maintaining common process standards when rolling out a global ERP system in an MNC. Although some practitioner studies assign the responsibility for business process improvement to the CIO (Blosch et al., 2005; McDonald and Nunno, 2007; McDonald et al., 2006, 2008), the empirical findings in this study indicate that corporate IT functions do not have accountability for process design, especially standardization initiatives, as they typically do not own the business processes.

- While the case studies confirm findings from paper I and propose the necessity of fit between international management strategy and process standardization, the findings do not indicate a direct relationship between international management strategy and ERP system distribution across an MNC. The empirical findings and previous studies on ERP architecture (e.g., Davidenkoff and Werner, 2008; Hufgard and Gerhardt, 2011) suggest that a single-instance, single-client ERP system may be configured to accommodate differentiated requirements in each subsidiary. Therefore, this study challenges some previous studies which assume that a global ERP system inevitably must be configured based on rigid rules and standards and thus conclude a direct relationship between the ERP distribution decision and the MNC's international management strategy (e.g., Clemmons and Simon, 2001; Madapusi and D'Souza, 2005).

4.3.4 Conclusion

This study contributes to answering RQ1 of this PhD study by asserting and explaining the necessity of alignment between an MNC's international management strategy and process standardization. An MNC's international management strategy defines its structural context and thereby influences the suitability of deploying process standardization as a centralizing structural coordination mechanism. By developing conditions of fit between process standardization and structural elements characterizing the strategy of an MNC, the study provides guidelines for process design and standardization in the course of a global ERP implementation and thus supports answering RQ2 of this PhD study. This study further contributes to answering RQ2 by proposing central permanent governance for managing business processes as a governance capability essential for defining, enforcing, and maintaining common process standards.

4.4 Paper IV: Business Process Management and IT Management: The Missing Integration

Authors: Fatemeh Rahimi, Charles Møller, Lars Hvam

Published in: *International Journal of Information Management,* 36.1 (2016)

4.4.1 Research objective

Findings from papers II and III imply that implementation of a global ERP system calls for central governance in managing business processes and IT systems. This study investigates the integration between BPM and IT management functions. The interdependencies between IT systems and business processes are widely recognized in the literature (e.g., Smith and Fingar, 2003b; Tarafdar and Gordon, 2007). Because of these interdependencies, several studies emphasize the need for IT role involvement in BPM activities on the one hand, and process roles inclusion in IT decision making on the other (e.g., Doebeli et al., 2011; Hammer, 2004; Scheer and Brabänder, 2010; Spanyi, 2010; Tarafdar and Gordon, 2007; Weill and Ross, 2004). However, collaboration between BPM and IT management functions is not reflected in their governance frameworks. To fill this gap, the current study investigates integration between BPM and IT management functions by asking and answering two questions: Why and how do BPM and IT management functions collaborate?

The study is conducted in three stages. First, by building linkages between the BPG and ITG literature, the study identifies shared responsibilities and integration points between BPM and IT management functions. Second, the study probes governance mechanisms that enable integration via a single in-depth case study of a multinational corporation with relatively mature BPG and ITG structures and decision-making processes. Third, drawing on the findings from the literature review and case study, the study suggests a framework that explains strategic and operational integrations between BPM and IT management functions based on the role of IT in an organization.

4.4.2 Research findings

Why BPM and IT management functions collaborate

In the first stage of the study, a comparative analysis of the literature on BPG and ITG demonstrates overlaps in the accountabilities specified within the two governance frameworks with respect to business–IT alignment and IT-enabled business value realization. Table 4-4 compares the literature on BPG and ITG with respect to these two responsibilities. Drawing on this finding, the study suggests the need for integration between BPM and IT management functions and aligning their governance frameworks to enable coordination of important interdependencies and collaboration on shared responsibilities.

How BPM and IT management functions collaborate

In the second stage, the study empirically investigates the governance mechanisms that enable integration between BPM and IT management functions for business–IT alignment and IT-enabled business value realization. As illustrated in Figure 4-6, the empirical findings indicate that the integration between BPM and IT management functions rely on horizontal integration capabilities designated in the BPG and ITG frameworks. The liaison positions situated in the strategic and operational levels of BPG and ITG structures and the sequentially or reciprocally integrated BPM and IT planning processes are the primary enablers for the integration. A further analysis of the case data identifies two properties of integration between BPM and IT management functions: the direction of integration and the planning level at which BPM and IT functions integrate. Facing variations in the direction of integration between BPM and IT management functions at strategic and operational levels, the study further analyses the case data and suggests that the IT role in the organization to be the mediating factor.

	Business–IT alignment	IT-enabled business value realization	References
BPG literature	* Ensuring that IT investments support the organization's business strategy is an essential role of BPG. * Process roles are responsible for aligning BPM efforts to strategic business and IT goals, choosing the optimal mix of IT investments, and providing demand analysis for IT implementations.	* BPG ensures that payoff from IT investments is derived from improvements in business process performance. * Process roles are responsible for monitoring the operating performance and continuous improvement of business processes.	Burlton (2010), Feurer et al. (2000), Hongjun and Nan (2011), Krichmer (2010), Korhonen (2007), Luftman (1996), Novotny and Rohmann (2010), Scheer and Brabänder (2010), Spanyi (2010), Tallon (2007), Tregear (2009), Trkman (2010)
ITG literature	* Business–IT alignment is the ultimate outcome of enterprise governance of IT. * Business roles involved in IT decision making are responsible for establishing and communicating strategic direction to IT leaders.	* IT value delivery is among the principal facets of ITG. * Non-IT roles with a seat in ITG structure are accountable for realizing IT-dependent business goals.	De Haes and Van Grembergen (2009), Van Grembergen and De Haes (2009), Peterson (2004), ITGI (2003), Rau (2004), Spremić (2009), Van Grembergen et al. (2004), Weill and Ross (2004), Wilkin and Chenhall (2010)

Table 4-4: Shared responsibilities specified in BPG and ITG frameworks

The empirical study also provides a description of how the BPM function is organized in the case MNC. The BPM organization comprises process owners, and process managers and consultants whose responsibilities are respectively comparable to the job description of process executives and process stewards as specified by Burlton (2010). One interesting observation, though, is the inclusion of process networks comprising representatives from individual subsidiaries in the BPM organization. While process owners and managers are accountable and responsible for business process design, inclusion of local representatives ensures that the design of business processes in alignment with local requirements.

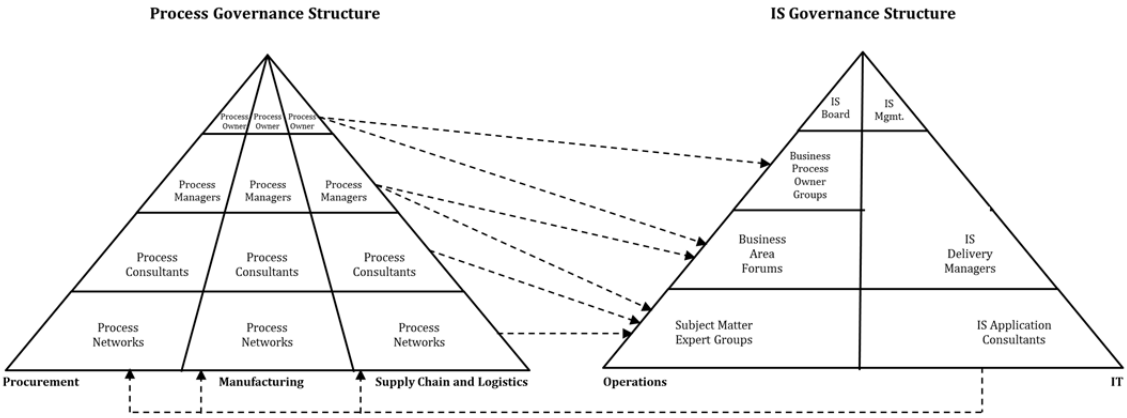

Figure 4-6: Integration between process governance structure and IT governance structure in case study organization

Conceptualizing integration between BPM and IT management functions

In the third stage, the study uses three emergent concepts — direction of integration, planning level of integration, and role of IT — to develop a framework that conceptualizes the integration between BPM and IT management functions in support of business–IT alignment. Drawing on Henderson and Venkatraman's (1993) strategic alignment model, the framework is constructed based on the premise that the way an organization positions itself to shape and enact business

strategies through IT influences integration between business and IT organizational structures — herewith the integration between BPM and IT management functions. The framework is presented in Table 4-5.

In organizations that perceive IT as a business enabler, IT strategy only reacts to business needs. Therefore in such organizations, the study argues for sequential integration at the strategic level between BPM and IT management functions. In such cases, as the IT strategy needs to be aligned with the business strategy and thereby BPM plans, high-ranking process roles are imposed on the ITG structure to communicate the BPM strategy and plans to IT managers and to take part in IT strategic decision making. Because IT strategy is a second-order consequence of business strategy and BPM plans, the process for strategic business and BPM planning provides direction for the strategic IT planning process. When IT acts as a business enabler, we expect reciprocal integration between BPM and IT management functions at the operational level. This is because such organizations deploy IT and typically off-the-shelf IT solutions to support core business processes and to improve their performance through greater efficiency. This enables IT consultants to considerably influence business process redesign based on best practices embedded in such IT systems. To facilitate reciprocal integration between processes for IT system design and process design, the ITG framework includes BPM liaison positions and the BPG structure incorporates IT liaison positions.

IT role	Planning level of integration: Strategic planning	Planning level of integration: Operational planning
Business enabler	**Sequential** * BPM involvement in strategic IT decision making is supported through BPM liaison positions situated in ITG structure. * BPM strategic planning directs IT strategic planning.	**Reciprocal** * IT involvement in process design and BPM involvement in IT system design occur through IT and BPM liaison positions respectively situated in BPG and ITG structures. * Process design both influences and is influenced by IT system design.
Strategic driver	**Reciprocal** * BPM involvement in strategic IT decision making and IT involvement in BPM strategic planning are supported through BPM and IT liaison positions situated in ITG and BPG structures. * BPM strategic planning both influences and is influenced by IT strategic planning.	**Reciprocal** * IT involvement in process design and BPM involvement in IT system design occur through IT and BPM liaison positions respectively situated in BPG and ITG structures. * Process design both influences and is influenced by IT system design.

Table 4-5: Strategic and operational integration between BPM and IT management functions based on IT role

Organizations that use IT as a strategic driver subsume IT into business strategy and exploit it for business transformation. Therefore in such organizations, the study argues for a two-way integration between BPM and IT management functions at both strategic and operational levels. Not only does the ITG framework include BPM liaison positions at the strategic and operational levels of its structure, but IT liaison positions are also situated in the BPG structure to facilitate the IT roles' contributions to strategic and operational BPM decision making. There is also reciprocal integration between BPM and IT strategic planning processes. This is also true for the processes handling business process design and IT system design.

4.4.3 Research contribution

Using findings from a literature analysis, this study proposes the necessity of aligning BPG and ITG frameworks in support of business–IT alignment and IT-enabled business value realization. Drawing on empirical findings from an in-depth case study, the study suggests that coordination and collaboration between BPM and IT management functions rely on horizontal integration

capabilities designated in the BPG and ITG frameworks. The study then proposes a framework that explains structural and process capabilities that enable integration between BPM and IT management functions at strategic and operational levels. The study further associates the direction of integration between BPM and IT management functions with the role of IT in an organization. At the strategic planning level, IT as a business enabler requires a sequential integration between BPM and IT management functions, while IT as a strategic driver gives rise to reciprocal integration. At the operational level, we propose that IT both as a business enabler and strategic driver encourages reciprocal integration between BPM and IT management functions. While assisting managers with the design of BPG and ITG capabilities and alignment of their mechanisms, this study has several implications for existing theories:

- The study suggests the necessity of integration between BPM and IT management functions in support of business–IT alignment and IT-enabled business value realization. In this way, it clarifies and resolves the conflict in the BPM and IT management literature that has included these responsibilities either within BPG or ITG frameworks (e.g., Burlton, 2010; Korhonen, 2007; Peterson, 2004; Rau, 2004; Scheer and Brabänder, 2010; Peppard et al., 2007; Spanyi, 2010; Tregear, 2009; Van Grembergen and De Haes, 2009; Weill and Ross, 2004; Wilkin and Chenhall, 2010).

- Although previous studies emphasize the necessity of IT role involvement in BPM decision making and process roles inclusion in IT decision making (e.g., Doebeli et al., 2011; Hammer, 2004; Spanyi, 2010; Tarafdar and Gordon, 2007; Scheer and Brabänder, 2010; Weill and Ross, 2004), the BPG and ITG frameworks do not reflect the collaboration between BPM and IT management functions. This study suggests the need for a new perspective defining BPG and ITG frameworks and draws attention to their interoperability to horizontally coordinate strategic and operational IT and business process decisions.

- While confirming previous studies on the necessity of involving "business parties" in IT decision making (e.g., De Haes and Van Grembergen, 2009; Peterson, 2004), this study specifically suggests process roles as important stakeholders in business–IT alignment activities, and therefore argues for inclusion of BPM liaison positions in ITG structure at both strategic and operational levels.

- The study supports previous literature that emphasizes the importance of IT professionals' understanding of and involvement in business planning (e.g., Teo and Ang, 1999, 2001; Ranganathan and Kannabiran, 2004). However, it proposes the role of IT as influential in the direction of strategic integration and thereby applicability of these integration mechanisms. IT managers' involvement in business and BPM strategic decisions depends on the perceived role of IT in an organization. However, as growth in the digital economy is increasing the importance of IT for business development, a higher level of engagement from IT managers in business strategic planning is expected.

- By suggesting the need for reciprocal integration between BPM and IT management functions at the operational level and proposing mechanisms for enabling integration, the study provides guidelines for managing the mutual adaptation and integrated design of business processes and IT systems as suggested by several studies, including Davenport et al. (2004), Leonard-Barton (1988), and Subramoniam et al. (2009). Including liaison positions in both BPG and ITG operational structures and reciprocal integration between processes for IT system design and process design not only ensures IT systems configuration in line with business requirements, but also enables exploiting IT potentials for improving business processes.

4.4.4 Conclusion

The findings from this study can be used to specify the governance capabilities supporting business process design and system configuration in the course of an ERP implementation, and

therefore supports answering RQ2 of this PhD study. First, the case study sheds more light on how BPM function is organized in MNCs. The case studied in this paper is an example of a case that succeeded in process standardization by relying on central permanent governance for managing business processes. However, as indicated in the case description, the central BPM function may still include representatives from local subsidiaries to ensure balance between global and local requirements when designing common business processes in the course of a global ERP implementation.

Second, the study suggests the need for integrating the processes for BPM and IT planning at the operational level, which implies the need for reciprocal integration between processes for business process design and ERP configuration. This enables mutual adaptation and integrated design of business processes and ERP system. The integration can be realized by imposing process roles on the IT management function to direct ERP system configuration based on business requirements. At the same time, ERP consultants should take the IT liaison positions in the BPG structure to guide business-process reengineering based on ERP system capabilities and limitations. While the BPM function should direct strategic ERP decisions based on business strategy and BPM strategic initiatives, IT managers' involvement in BPM strategic decisions depends on the role of IT in the organization.

4.5 Paper V: Enterprise Architecture Management: Toward a Taxonomy of Applications

Authors: Fatemeh Rahimi, John Gøtze, Charles Møller

Submitted for: Second round of review

4.5.1 Research objective

Paper IV suggested the need for integration between BPM and IT management functions for aligning strategic and operational decisions on business processes and IT systems. Paper V investigates EAM as a methodology with potentials for facilitating coordinated management of business processes and IT systems, despite the fact that EAM applications have typically been limited to supporting enterprise-wide management of IT architecture (e.g., Boh and Yellin, 2006; Lagerström et al., 2011). Indeed, researchers and practitioners still lack a common understanding of EA's meaning, scope, and applications. The ambiguity of the term EA and confusion around EAM applications served as motives to conduct a study to clarify the terminology and various applications of EAM in organizations. In this quest the study asks and answers two questions: What does EA mean? How do organizations use EAM?

The study is conducted in three stages. First, to answer the questions, a structured literature review compares various perspectives on the term EA and different views of EAM applications among EA researchers. A synthesis of the review led to a taxonomy that classifies EAM applications based on three perspectives of EA scope. Second, the study examines the taxonomy using case studies of eight Danish organizations with discrete EA functions. Adopting a theoretical sampling methodology (Eisenhardt, 1989), the cases are selected based on three EA archetypes derived from the literature analysis. Third, the study refines the taxonomy based on empirical findings. The taxonomy sheds light on the wider range of EAM applications in organizations, especially EAM support for business strategy formation and planning.

4.5.2 Research findings

Four perspectives on EA, three perspectives on EA scope

Drawing on the findings from a literature review, the study identifies four strands defining EA as inherent enterprise structure (e.g., Bradley et al., 2012), blueprint of an enterprise in its various facets (e.g., Rood, 1994), set of principles prescribing enterprise architecture design (e.g., Hoogervorst, 2004), and methodology or process guiding the design of enterprise architecture (Lapkin et al., 2008). We attribute the differences in perceptions of EA to lack of agreement on defining the term "architecture." Building upon the ISO 42010:2011 definition of architecture, the study clarifies that EA is not a description or a management methodology, but rather the inherent structure of an enterprise. The study defines EA as the fundamental conception of the enterprise in its environment embodied in its elements, their relationships to each other and to its environment, and the principles guiding its design and evolution. EAM then is a management approach that supports planning, developing, and controlling the enterprise's architecture in a coordinated and purposeful manner by providing a holistic understanding of the EA and ensuring adherence to EA principles and standards.

Comparing the various definitions of EA, the study also identifies three perspectives on EA scope among researchers. In its simplest form, EA researchers limit EA scope to technical information components, such as application, data, and technology (e.g., Richardson, 1990; Zachman, 2009). In other studies, EA scope extends from pure IT components to a multi-perspective concept that also covers business architectural elements. However, the study identifies disagreements among researchers on what business architecture consists of. Some researchers consider EA scope to encompass elements that realize business capabilities, such as business processes, information entities, and organizational structures (e.g., Lankhorst, 2005; Ross et al., 2006). Others extend

EA scope even further to incorporate strategic business elements of an organization, such as vision, mission, strategy, value proposition, channels, and customer segments (e.g., Bernard, 2012; Simon, 2014). The study associates the confusion regarding EA scope to disagreements on defining the term "enterprise."

The study then uses the three views on EA scope to develop a taxonomy that classifies various EAM goals and applications. To develop the taxonomy, we map EAM studies to one of the three classes based on each study's perception of EA scope.

System thinking complements EA thinking

The study then examines the three perspectives on EA and associated EAM applications by conducting case studies in eight Danish organizations. As indicated in Figure 4-7, the cross-case analysis identifies two factors that distinguish the EAM applications in the eight cases from each other. The first factor is EA scope, indicating variables for which enterprise architects have design authority. The EA scope in each case matches one of the three EA scopes identified in the literature analysis. The second factor that differentiates the cases from each other is EA function influence on design of architectural elements external to its associated EA scope. Within each of the three groups of EA scopes, enterprise architects in more mature cases not only understand the environment to plan EA evolution accordingly, but also actively attempt to influence it to better manage the EA evolution. The study explains this observation by adopting a system view of an enterprise. Because EA as an open system is not independent from its ecosystem, controlling and understanding its behavior not only require understanding its operations, but also its broader surrounding context. As knowledge about the environment increases, so does the ability to convert uncontrollable variables to those that can be influenced (Gharajedaghi, 2011).

The empirical findings suggest that while EA scope defines architectural elements whose design could be controlled by enterprise architects, the environment external to EA scope is not entirely a context variable for EAM activities. Therefore enterprise architects manage EA evolution not only in sequential alignment with the environment but also by influencing — not controlling — design of elements external to EA scope. This suggests the necessity of integrating systems theory and enterprise architecture thinking for managing EA design and evolution.

In addition, as illustrated in Figure 4-7, mapping the eight cases based on their EA scope suggests a trend for extending EAM applications in organizations. In other words, organizations adopt EAM to support various strategy management processes, and as the EAM concept becomes more mature, its applications are extended to a wider range of strategic processes. However, not all studied organizations have extended their EAM application in the same manner. We noticed industrial sector and business governance model differences between IT-centric EAM cases and those that adopt EAM for business management.

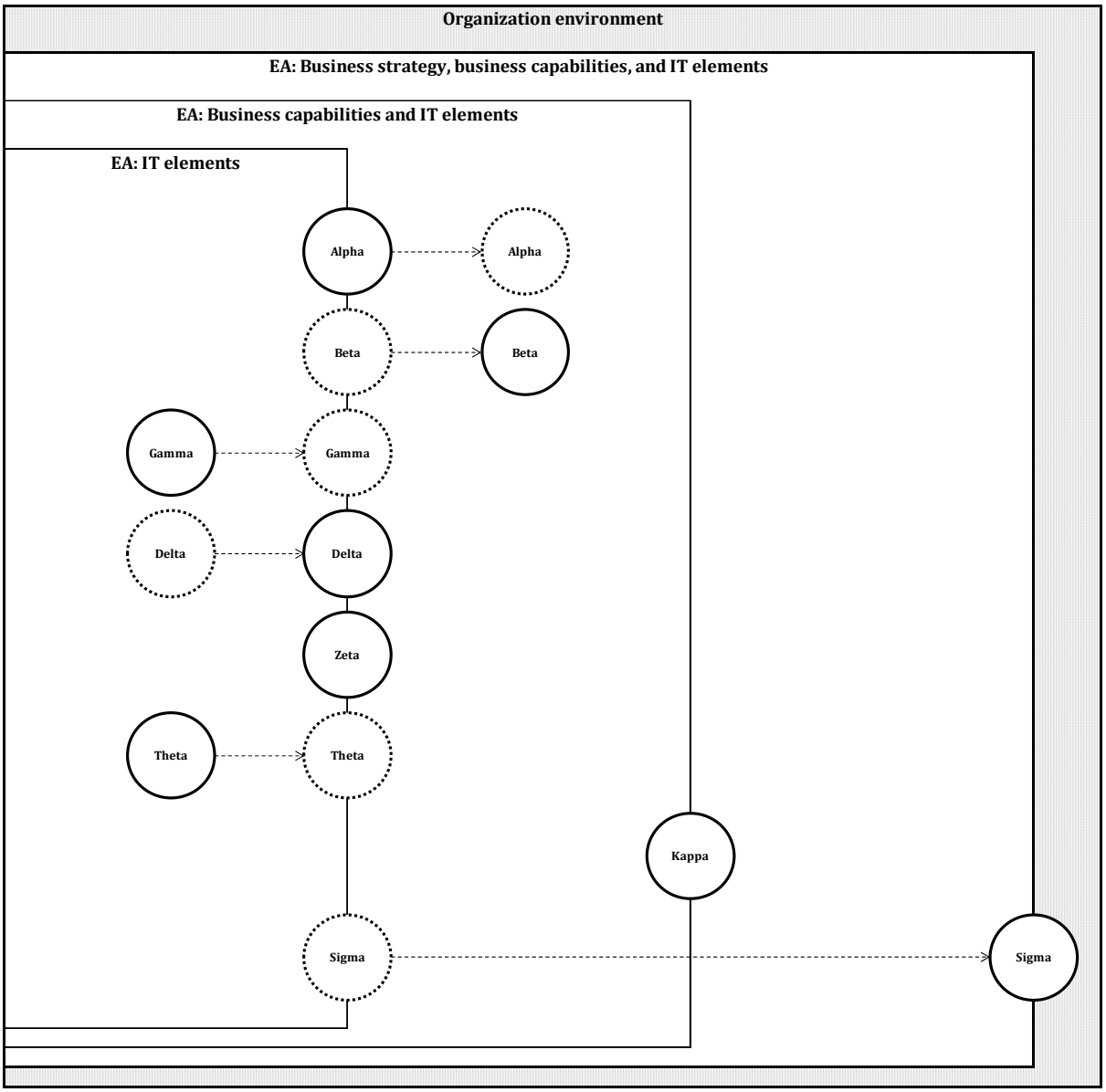

Figure 4-7: Mapping of eight cases based on EA scope

EAM taxonomy

Arguing that a given view of EA scope influences EAM goals and applications, the study uses the findings from the literature analysis and case studies to develop a taxonomy of EAM goals and applications. The taxonomy is presented in Table 4-6. The archetypes are labeled according to the organization process or function EAM may support. Each archetype includes and transcends EA scopes and EAM goals and applications in previous archetypes.

When EA scope is limited to IT elements, organizations adopt EAM to ensure coherent and consistent design of IT systems. Therefore, enterprise architects are involved in processes for IT strategy formation, planning, and implementation to ensure coordinated acquisition, development, and implementation of IT systems. The EA function is located within the IT organization and comprises architect roles covering application, data, and technology components of EA. While business strategic initiatives and required capabilities are inputs for IT architecture design, architects may still influence business architectural elements to better manage IT architecture complexity and enable IT-driven business innovations.

	IT management	Business capability management	Business strategy management
EA scope	IT elements	Business capability elements	Business strategy elements
EAM goal	Coherent and consistent design and evolution of IT elements in mutual alignment with business strategy and capabilities	Coherent and consistent design and evolution of business capabilities realization elements in mutual alignment with business strategy	Coherent and consistent design and evolution of business model in mutual alignment with market environment
EAM application	* Complements IT strategy formation, planning, and implementation * Influences business strategy formation and planning	* Complements business strategy planning and implementation * Influences business strategy formation	* Complements business strategy formation

Table 4-6: Taxonomy of EAM applications based on EA scope

When EA scope extends to cover business capability elements, the EAM goal is to ensure coherent and consistent design of business capability elements in integration with IT components. The EA function formally supports business strategy planning and implementation processes. Enterprise business architects are now part of an EA function that is spread between business and IT organizations. While business strategy and strategic initiatives are inputs for design activities, enterprise business architects may still influence business strategy by explicating its impact on business capability elements, and providing input about performance of business capability elements in realizing business objectives, and suggesting initiatives to improve business architecture performance.

When EA scope covers strategic components of business, EAM ensures coherent design of the business model in integration with business capabilities and IT elements. The EA function supports formation of the business strategy and business model in alignment with the external environment and internal resources. The EA function also formally supports devising initiatives to reduce the complexity of business architecture and improving its performance in line with industry standards. With an understanding of market dynamics, enterprise business architects also enable innovation by devising strategic scenarios that bring the organization's ecosystem in line with strategic goals. To enable enterprise business architects' participation in business strategy formation, they are situated close to executive-level managers.

4.5.3 Research contribution

This study uses the three identified views of EA scope to classify EAM applications in organizations. The taxonomy suggests that an EA scope limited to IT components restricts EAM applications to supporting IT strategy formation, planning, and implementation; an extension of EA scope to cover business capability elements enables EAM to also support business strategy planning and implementation; and extending EA scope even further to cover business strategic elements turns EAM into a systematic approach supporting all of the above processes and business strategy formation.

Besides eliminating confusion about the EAM applications, the taxonomy assists managers to deliberately decide about adoption of the EAM concept for various strategic management processes, scope of enterprise architects' responsibilities, and integration of the EA function into organizational governance. Furthermore, the study has several theoretical implications:

- The taxonomy challenges the traditional view that considers EAM a management discipline to support enterprise-wide management of IT architecture (e.g., Boh and Yellin, 2006; Lager-

ström et al., 2011), and instead proposes EAM as a method with potential to facilitate consistent and coordinated management of complex business and IT asset landscapes. Study results suggest implementing EAM applications not only to support IT management, but also to facilitate business strategy formation, planning, and implementation. While the case studies indicate a trend for extending EAM applications in organizations, the findings may suggest the influence of contingency factors on the evolution path and thus reinforce situational EAM studies suggesting that the EAM development path is organization specific (e.g., van der Raadt and van Vliet, 2009).

- The findings challenge studies that associate enterprise architects solely with an IT identity even when they are involved in business strategy planning (e.g., Blosch and Burton, 2014). The study suggests that enterprise architects' involvement in business strategy management is not limited to leveraging opportunities from emerging IT trends and IT resources, but rather by providing a comprehensive understanding of the organization in its environment, enterprise architects support developing business strategy in alignment with a broader range of competitive and market forces.

- By reinforcing the importance of adopting the open systems principle for managing EA design and evolution (e.g., Gharajedaghi, 2011), the study challenges the strictly hierarchical approach for EA development (e.g., Braun and Winter, 2005). This is in line with Hoogervorst and Dietz (2013) and Korhonen (2013) who suggest that a strictly hierarchical approach fails to consider the impact of lower-level dimensions on higher-level decisions.

4.5.4 Conclusion

By suggesting EAM as a methodology for coherent and consistent design of an organization, this study contributes to answering RQ3 of this PhD study. EAM can support consistent design of business processes by allowing for holistic understanding of business processes in the wider context of an organization. For EAM to support business process design in the course of a global ERP implementation, EA scope should cover IT components and business capability elements as design variables. EAM then supports coherent and consistent design of business processes and corporate process standards in alignment with the corporate business strategy and integrated design of business processes and IT systems, including ERP. To support business process design in the course of a global ERP implementation, the EA function should comprise business and IT architects respectively situated in the business and IT sides of the organization. By providing a holistic and integrated understanding of business processes, business architects support business process owners and managers with BPM decision making, and planning, developing, and controlling business process architecture evolution. Business architects also support and validate BPM projects and ensure their conformance to EA policies and BPM standards.

4.6 Chapter summary

Chapter 4 presented a summary of the five descriptive studies conducted in the course of this PhD study.

- Paper I provided a comprehensive understanding of the factors that influence process standardization in MNCs. Assuming the factors that impact process standardization to be a subset of factors influencing formalization, convergence, and transfer of practices in organizations, the study proposed a framework that explained the heterogeneity of business processes across an MNC based on the corporate strategic, institutional, relational, and organizational contexts. The framework was tentatively examined in a single case study.

- Paper II studied the factors that influence the choice of ERP architecture in MNCs and especially looked into the implications of process standardization for a single-instance global ERP system. Drawing on a literature review, the study suggested that lack of process standardization negatively influences a single-instance global ERP system's total cost of ownership and its deployment as an integrative mechanism. The study further elaborated on this finding through informant interviews.

- Paper III investigated the association between process standardization and international management strategy of an MNC reflected in its asset configuration and headquarters–subsidiary relationships. The study explained the fit by raising the issue of causality, that is, by investigating how international management strategy and consequent structural characteristics affect process standardization as a centralizing coordination mechanism. The study formulated and empirically investigated two propositions that argued for a better fit between process standardization and MNCs structured for global integration compared to those structured for local responsiveness. Building on these propositions, the study developed conditions of fit between an MNC's structural elements and process standardization.

- Paper IV studied the "why" and "how" of collaborations between the BPM and IT management function. Drawing on findings from an extensive literature review, the study suggested BPM and IT management functions share the responsibility for business–IT alignment and IT-enabled business value realization. Using a single case study, the study investigated the governance mechanisms that enabled horizontal integration between BPM and IT management functions in support of business–IT alignment. The study then conceptualized the integration between BPM and IT management functions based on the role of IT. The result was a framework that explained the structural and process governance capabilities that enabled integration between BPM and IT management functions at the strategic and operational levels.

- Paper V clarified the concepts of EA and EAM. Identifying three different views on EA scope among researchers, the study developed a taxonomy that classified the applications of EAM in organizations based on the three EA scopes. The study then refined the taxonomy using the empirical findings from eight case studies. The taxonomy suggested that depending on EA scope and its coverage of IT elements, business capability elements, or business strategy elements, EAM can be applied to complement processes for IT strategy formation, planning, and implementation; business strategy planning and implementation; or business strategy formation.

5 CONCLUSIONS

This chapter presents a discussion of this PhD study's theoretical and practical contributions, limitations, and future research directions. The theoretical contributions summarize how the findings and conclusions from the five studies answer the research questions in relation to the existing body of literature. The practical contribution summarizes the managerial implications of this PhD study by enumerating the BPM alignment, governance, and methodological capabilities that need to be in place for supporting and improving business process design in the course of a global ERP implementation. The limitations delineate applicability of results, and future research suggests directions for further studies based on the knowledge generated throughout this PhD study.

5.1 Theoretical contribution

Theoretically significant research is intellectually implicative for the scholarly community, extending, building, and critiquing disciplinary knowledge (Tracy, 2010). This study builds on past research but provides new understandings of business process design in the context of global ERP implementations. This section presents the theoretical contribution of this PhD study. The first part of the section answers the research questions along with a description of how this study extends or problematizes current theoretical assumptions. The second part of this section, and more specifically Table 5-1, presents a different view by summarizing the research contributions to the practical and theoretical challenges identified in sections 1.3 and 2.5.

The objective of this study was to answer three research questions: "Why is business process design critical in the course of a global ERP implementation?" (RQ1), "How can we support business process design in the course of a global ERP implementation?" (RQ2), and "How can we improve business process design in the course of a global ERP implementation?" (RQ3). While the first question aimed at creating an understanding of the importance of business process design in the context of global ERP implementations, the other two questions explored the alignment, governance, and methodological capabilities required to manage business process design in the course of global ERP implementations. The answers to the three research questions of this PhD study can be summarized as follows:

- RQ1: Business process design in the course of a global ERP implementation is critical because:

    a) On the one hand, business process design, particularly process standardization, needs to be in alignment with, and is influenced by, the MNC's strategic, institutional, organizational, and relational contexts. On the other hand, process standardization is essential to deploy a global ERP system as an integrative mechanism and to reduce ERP system complexity and thus its implementation and operation costs. Business processes need to be deliberately designed while keeping these two opposing forces in mind; however, when

implementing a global ERP system, the bias should be in favor of process standardization to minimize the disadvantages of technical integration.

- RQ2: Business process design in the course of a global ERP implementation can be supported by:

  a) Aligning decision making for process standardization with corporate international management strategy reflected in its asset configuration and headquarters–subsidiary relationships. This will resolve the universality–individuality and efficiency–flexibility dilemma by ensuring that process standardization as a centralizing coordination mechanism does not disturb the particular headquarters–subsidiary relationships and is deployed to improve coordination efficiency by facilitating interdependencies across the corporation.

  b) Establishing central permanent governance for managing business processes to support defining, enforcing, and maintaining process standards during and after the global ERP implementation. Furthermore, central BPG prohibits divergence of process standards to a point where it is not possible to accommodate them in a single-instance ERP system.

  c) Horizontally and reciprocally integrating the central functions for management of business processes and IT systems at the operational level, realized through the liaison positions in the BPG and ITG structures. This enables reciprocal integration between processes for business process design and ERP configuration. The reciprocal integration not only ensures ERP system configuration in line with business requirements, but also enables exploiting the ERP system's potentials for improving business processes.

- RQ3: Business process design in the course of a global ERP implementation can be improved by:

  a) Adopting EAM that through its multi-perspective view of an enterprise not only facilitates alignment between business process design and corporate strategy but also supports integrated design of business processes and the ERP system. For this purpose, the scope of EA should cover both IT and business capability elements as design variables and the EA function should comprise business and IT architects respectively situated on the business and IT sides of the corporation.

In the remainder of this section, I elaborate on the answers to the three research questions.

- RQ1: Why business process design is critical in the course of a global ERP implementation?

RQ1a: Implementing a global ERP system, MNCs are often confronted with a fundamental question concerning how much uniformity should exist in the way they do business in different regions or countries (section 2.2.2). While a single-instance global ERP system may be configured to accommodate differentiated requirements in each subsidiary (paper II), process standardization is greatly important when implementing global ERP systems in MNCs. This is because discrepancies in configuration of a single-instance global ERP system increase system complexity and thereby its implementation and maintenance costs, which in turn negatively influences the agility for business and system changes (papers II). Furthermore, lack of process standardization negatively impacts a global ERP system deployment as an integrative mechanism and thereby its support for control and coordination of global operations and remote subsidiaries (paper II).

However, the findings from papers I and III suggest an MNC's strategic, institutional, organizational, and relational contexts to be influential in unifying process standards across corporate subsidiaries. An MNC's international management strategy defines its structure and thus influences the suitability of deploying process standardization as a centralizing coordination mechanism (papers I and III). Furthermore, the multiplicity of institutional contexts and institutional distance across corporate subsidiaries increases the likelihood of misalignment between a globally standardized process and subsidiaries regulatory, cognitive, and normative institutions and therefore difficulties in the transfer process (paper I). The outcome of process standardization efforts is further influenced by the organizational context of subsidiaries in terms of their motivation for absorbing knowledge from outside, and their absorptive and retentive capacity (paper I). Process standardization may still fail even when strategic, organizational, and institutional contexts are favorable. The last potential reason for failure could reside in the relationships that exist between the parties involved in the process standardization effort (paper I). Subsidiaries' commitment to, identity with, and trust in the headquarters are suggested to be influential in the success of transfer process (paper I).

Because on the one hand process standardization is essential for integration and reducing the global ERP system's complexity, and on the other hand the heterogeneity of contexts across corporate subsidiaries opposes process standardization, MNCs typically face a dilemma between process standardization and localization when implementing global ERP systems. The question of standardization versus localization is one of balance. Still, this study suggests that the bias should be in favor of process standardization to moderate the complexities caused by technical tight integration (paper II).

Indeed, the findings in paper II assert the previous studies that suggest a higher level of commonality in business processes to better justify the choice of single-instance ERP architecture (e.g., Davenport, 1998; Ives and Jarvenpaa, 1991; Rayner and Woods, 2011). Furthermore, while previous studies on BPM and global ERP implementations provide a limited and mechanistic view to factors influencing process standardization in MNCs (e.g., Harmon, 2007; Ross et al., 2006), this study offers a more comprehensive understanding of the phenomenon. Viewing business processes as systems and social constructs, rather than solely "a sequence of activities that transform inputs to outputs using the enablers and constrained by guidelines" (Tregear, 2010), this study clarifies a wider range of strategic, institutional, relational, and organizational factors that should be taken into account when designing business processes in an MNC.

- RQ2: How can we support business process design in the course of a global ERP implementation?

RQ2a: Process standardization efforts in MNCs are often hindered by universality–individuality and efficiency–flexibility dilemmas (section 2.2.2). Papers I and III suggest that process standardization as a centralizing coordination mechanism needs to be in line with the international management strategy of an MNC. Paper III further explains the causality and suggests that process standardization has a higher degree of fit with MNCs structured for global integration, in which process standardization coordinates interdependencies in the functional structure and

does not disturb the operational control relationship between the headquarters and subsidiaries. Process standardization has a lower degree of fit with MNCs pursuing a local responsiveness strategy, in which process standardization disturbs the financial control relationship between headquarters and subsidiaries and is less required for coordination as subsidiaries contain most of the necessary coordination mechanisms. These two propositions imply that while an MNC's asset configuration indicates whether process standardization is essential for coordinating the interdependencies across corporate subsidiaries, the nature of headquarters–subsidiary relationships determines whether process standardization disturbs the balance of power between the headquarters and subsidiaries.

Explaining the necessity of fit between international management strategy and process standardization, this study challenges some other studies that by adopting a mechanistic view to business processes argue for process standardization only based on comparability of operations and similarity of outputs across an MNC's subsidiaries (e.g., Harmon, 2007). Although operational similarity is a driver for process standardization, this study argues that process standardization is a centralizing coordination mechanism and therefore its deployment in an MNC also needs to be in line with corporate strategic and structural contexts. The study suggests asset configuration and headquarters–subsidiary relationships as two important structural elements to consider when managing the conflicts caused by universality–individuality and efficiency–flexibility dilemmas in the course of a global ERP implementation (paper III).

RQ2b: Some MNCs struggle with defining and enforcing common process standards when designing business processes in the course of a global ERP implementation (paper III). In addition, organizations are often challenged with sustaining and improving the ERP solution and embedded business processes after the project termination (paper III; section 2.3.1). Indeed, inter-organizational BPG strategies are more limited when business processes cross the boundaries of legal entities (section 2.3.1). Mintzberg (1993) suggests that when an organization relies on systems of standardization for coordination, some power passes out from line managers to the designers of those systems. In line with this proposition, paper III suggests that central ownership of business processes is essential for enabling definition and enforcement of common process standards when implementing a global ERP system. The central BPM function also enables deciding about local deviations based on their criticality and inevitability (Tregear, 2010). While a single-instance global ERP system may considerably accommodate different requirements across subsidiaries, central governance for management of business processes prohibits divergence of process and data standards to a point where it is not possible to accommodate them in a single ERP system (paper II).

Furthermore, central ownership of business processes needs to be a permanent role to prohibit unnecessary divergence of process standards after the global ERP program termination and to ensure that adjustments occur in line with business evolution (paper III). The permanent governance further ensures realization of business values from ERP investments (paper IV) and eliminates the need for specific governance arrangements for ERP benefit realization as suggested in practitioner studies (e.g., Deloitte Consulting, 2010; Kavanagh, 2006). To manage the global versus local balancing act, the central BPM function may include representatives from individual subsidiaries (paper IV). While the corporate process roles decide about and maintain the common process standards, local representatives contribute to business process design by communicating their respective subsidiarity's process requirements.

This study not only suggests that process standardization increases the level of centralization in an MNC (Mintzberg, 1993), but also argues that achieving common process standards requires central governance for management of business processes to be in place. This study contributes to the previous studies on BPG in three ways. First, while reinforcing the previous studies on the necessity of "business parties" involvement in IT decision making (e.g., De Haes and Van Grembergen, 2009; Peterson, 2004), this study specifically suggests process roles as important stakeholders in business–IT alignment activities, and therefore argues for inclusion of process roles in both strategic and operational IT decisions (paper IV). Second, although some practitioner studies assign the responsibility for BPM to the CIO (e.g., Blosch et al., 2005; McDonald and Nunno,

2007; McDonald et al., 2006, 2008), this study indicates that corporate IT management functions cannot be held accountable for process design, especially process standardization initiatives, as they typically do not own the business processes (paper III). Third, while the temporary project-oriented approach toward BPM is popular when implementing ERP systems (section 2.3.1), this study suggests that permanent governance for management of business processes is essential for maintaining the global ERP solution (paper III).

RQ2c: Achieving alignment between an organization's business requirements and capabilities embedded in the ERP system is one of the main challenges of ERP implementations. Adopting ERP systems, several studies suggest a middle ground between process- and IT-driven approaches to exploit the role of IT both in supporting and enabling business processes. However, prescriptions and guidelines for how to manage the balanced approach are scarce (section 2.2.1). Particularly, collaboration between BPM and IT management functions is neglected in their governance frameworks (section 2.3.2). To coordinate strategic and operational IT and business process decisions, paper IV suggests the necessity of horizontal integration between BPM and IT management functions. It further argues that while the direction of integration between BPM and IT management functions at the strategic level depends on the role of IT in an organization, BPM and IT management functions should be reciprocally integrated at the operational level irrespective of the role of IT. Coordination between BPM and IT management functions should rely on horizontal integration capabilities designated in the BPG and ITG frameworks. The liaison positions situated in BPG and ITG structures are the primary enablers for the integration (paper IV).

To enable the balanced approach for ERP adoption, processes for business process design and ERP system configuration need to be reciprocally integrated. The reciprocal integration not only ensures ERP system configuration in line with business requirements, but also enables exploiting the ERP system's potentials for improving business processes. To enable the reciprocal integration, the process roles should be imposed on the IT management function to direct ERP system configuration based on business process requirements. In addition, ERP consultants need to take the IT liaison positions in the BPG structure to influence business process design based on ERP system capabilities and best practices and to prohibit ERP complexity and excessive system adaptation. While IT managers' contribution to strategic BPM decisions depends on whether IT is perceived as a strategic driver, the central BPM function should also direct strategic ERP decisions based on business strategy and BPM strategic initiatives.

This study contributes to the existing body of knowledge on BPG and ITG in four ways. First, by suggesting the need for integration between BPM and IT management functions in support of business–IT alignment, this study clarifies and resolves the conflict in BPM and IT management literature that have included this responsibility either within BPG or ITG frameworks (e.g., Burlton, 2010; Korhonen, 2007; Peterson, 2004; Rau, 2004; Scheer and Brabänder, 2010; Peppard et al., 2007; Spanyi, 2010; Tregear, 2009; Van Grembergen and De Haes, 2009; Weill and Ross, 2004; Wilkin and Chenhall, 2010). Second, while several studies have emphasized the need for IT roles involvement in BPM activities on the one hand, and process roles inclusion in IT decision making on the other, collaboration between BPM and IT management functions is not reflected in their governance frameworks. ITG frameworks are built around active involvement of business parties in IT decision making (e.g., De Haes and Van Grembergen, 2009; Peterson, 2004), but they overlook the role of BPM functions in making and monitoring IT decisions. This disconnect is also true for BPG frameworks. Although IT often influences and is influenced by business processes, BPG frameworks fail to specify the involvement of IT roles in BPM decision making. This study suggests the need for a new perspective defining BPG and ITG frameworks and draws attention to their interoperability to horizontally coordinate strategic and operational IT and business process decisions (paper IV).

Third, by clarifying the integration between BPM and IT management functions and the enabling mechanism, this study sheds more light on the governance capabilities required to manage the balanced approach for designing business processes and enterprise systems, proposed by Davenport et al. (2004), Leonard-Barton (1988), and Subramoniam et al. (2009). Fourth, by suggest-

ing a reciprocal integration between processes for business process design and IT design (papers IV and V), this study reinforces the importance of system thinking for managing design of business processes and IT systems. This study illustrates that a strictly hierarchical approach — similar to the ones suggested in e.g., Burlton (2010), Kirchmer (2010) — fails to consider the impact of lower-level dimensions on higher-level decisions (paper V).

- RQ3: How can we improve business process design in the course of a global ERP implementation?

RQ3a: Business process design heavily relies on a comprehensive and integrated understanding of the business strategy and IT systems (section 2.4.1). However, most studies on BPM during ERP implementations are confined narrowly on business process modeling, which by providing a solely process view of organizations does not support consistent design of business processes in alignment with other architectural elements of an organization (section 2.4.1). Paper V discusses the concept of EAM as an approach that, by taking an integrated multi-perspective view, facilitates coherent and consistent design of an enterprise's architecture.

Paper V points out that while coherent and consistent design and evolution of EA is the major goal of EAM, the impact of EAM on the real-world state of an organization may differ depending on EA scope and thus the range of processes that EAM could be incorporated into. It further identifies three perspectives on EA scope among researchers and practitioners. EA scope may be limited to technical information components, may extend to cover elements realizing business capabilities, or extend even further to incorporate strategic business elements of an organization. For EAM to support business process design, EA scope should not only cover IT elements but also business capability elements as design variables. With such an extended scope, EAM can enable consistent design of business processes by allowing for holistic understanding of business processes in the wider context of an organization. EAM modeling and analytic capabilities facilitate operationalization of business strategy into target architecture for business processes, operationalization of business processes into target architecture for IT, and impact analysis of various design scenarios on business and IT architectures (paper V).

For EAM to support integrated design of business processes and IT systems, the EA function should not only comprise IT architects but also business architects situated on the business side of the organization (paper V). Situating enterprise business architects on the business side enables their better understanding of the business context and their authority for guiding business architecture design (paper V). Business architects support business process owners and managers with BPM decision making and planning, developing, and controlling business process architecture evolution, validate conformance of BPM projects to EA principles, and create and maintain architecture documents including business process architecture. These responsibilities are comparable to the service portfolio of a BPM center of excellence, which is in charge of providing BPM consultancy services, ensuring process compliance, and process modeling (Rosemann, 2010; Scheer and Brabänder, 2010). This may suggest including business architects in a BPM center of excellence, which would resolve the disconnect between BPM and EA functions in organizations (section 2.4.2).

With such an extended scope, during an ERP implementation, EAM guides coherent and consistent design of business processes and corporate process standards in alignment with the corporate business strategy. Furthermore, having business capability elements as design variables enables EAM for facilitating integrated design of business processes and ERP system. In addition, the business process modeling as a part of EA modeling facilitates acquiring, communicating, and validating requirements in the blueprinting stage of the ERP implementation.

By clarifying the different perspectives on EA and various applications of EAM in organizations, this study contributes to the existing theories on EAM and BPM in two ways. First, this study challenges the traditional view that limits EAM application to managing IT architecture design and evolution (e.g., Boh and Yellin, 2006; Lagerström et al., 2011), and introduces EAM as an approach with potential to facilitate consistent and coordinated management of complex business and IT asset landscapes. Indeed the empirical findings in paper V indicate a trend for ex-

tending EAM applications in organizations, which promises more extensive applications of EAM for management of business architectural elements, including business processes. Second, by proposing EAM as a method for supporting business process design and analysis, this study suggests the need for a new perspective on BPM tools in support of alignment. Despite BPM emphasis on strategically aligned business processes, traditional BPM methods typically focus on providing a process-centric understanding of an organization that only support design and analysis of business processes in isolation from their context. EAM by providing an integrated understanding of business strategy, business capability, and IT components of an organization clarifies the linkages between various architectural domains and thus ensures consistent design of business processes in alignment with other architectural components.

	Practical challenges	Theoretical challenges	Contribution of this PhD study
Alignment	What contingency factors are decisive for business process design in the course of a global ERP implementation? How should process standardization be aligned with corporate contingencies?	Although acknowledging that process standardization may be hindered by personal preferences, power relations, and cultural differences across an MNC, the BPM literature adopt a mechanistic view to business processes and encourage process standardization based on the similarity of process structure, procedure, and outputs. ERP implementation studies better emphasize the impact of human, organizational, and environmental aspects of business processes on process standardization, but do not provide a holistic understanding of factors influencing process standardization. Furthermore, while there are compelling arguments for and against process standardization, earlier studies do not provide guidelines for resolving the dilemma between process standardization and localization in the course of a global ERP implementation.	By viewing business processes as deterministic machines, systems, and social constructs, this study provides a comprehensive understanding of the factors that cause variations in business processes across an MNC. The study suggests a range of strategic, institutional, relational, and organizational factors to be influential in process standardization in the course of a global ERP implementation. Process standardization needs to fit an MNC's international management strategy and its structural characteristics. Process standardization is also hindered by the multiplicity of institutional contexts across an MNC and the regulatory, cognitive, and normative distance across the subsidiaries. The outcome of process standardization efforts is further influenced by the subsidiaries motivation for absorbing knowledge from outside, their absorptive and retentive capacity, and their commitment to, identity with, and trust in the headquarters. This more comprehensive overview better supports foreseeing the challenges and efforts required for process standardization, and managing the dilemma between process standardization and localization. The study particularly investigates the impact of strategic and structural context of an MNC on process standardization. Viewing process standardization as a centralizing coordination mechanism, the study recommends the necessity of alignment between process standardization and an MNC's international management strategy and the consequent structural characteristics in terms of asset configuration and headquarters–subsidiary relationships. An MNC's asset configuration indicates whether process standardization is essential for coordinating the interdependencies across corporate subsidiaries, and the nature of headquarters–subsidiary relationships determines whether process standardization disturbs the balance of power between the headquarters and subsidiaries. Given these findings, the study provides guidelines for fitting process standardization decision to an MNC's structural characteristics. Therefore, while asserting the importance of operational similarity for process standardization, this study emphasizes the importance of fit between process standardization and an MNC's structural context. However, by clarifying the downsides of technical integration and negative implications of lack of process standardization for global ERP system's integrative capability and total cost of ownership, this study suggests that the bias should be in favor of process standardization when an MNC decides for a global ERP system.

	Practical challenges	Theoretical challenges	Contribution of this PhD study
Governance	What governance mechanisms enable business process design in the course of a global ERP implementation?	Previous studies suggest two different approaches for structuring and staffing BPM activities. Considering BPM, and particularly business process design, an episodic activity, some studies suggest temporary governance mechanisms for managing business process design projects. This approach is popular when implementing IT systems, particularly ERP systems. However, this often necessitates alternative governance arrangement after the project termination to maintain the ERP solution. Other studies consider business process design a continuous activity and therefore argue for establishing permanent ownership of business processes. There are scarce studies on BPG in the context of MNCs.	This study argues that process roles are important stakeholders in IT decision making and herewith ERP implementations and suggests that a central permanent BPM function direct business process design during and after a global ERP implementation. Central ownership of business processes is essential for defining and imposing common process standards in the course of a global ERP implementation. Although an ERP implementation is a temporary endeavor, the study suggests the necessity of permanent governance for BPM activities to maintain the common process standards embedded in the ERP system and prohibit their uncoordinated divergence. The permanent ownership of business processes also enables business value realization from ERP investments. To achieve a balance between global and local requirements, the central governance for management of business processes may include representatives from individual subsidiaries.
		To preserve an organization's competitive advantages and to avoid excessive complexities of fitting an ERP system to business processes, literature suggests mutual adaptation of the ERP system and business processes. However, there are scarce studies on how to operationalize this approach. Particularly, collaboration between BPM and IT management functions is neglected in their governance frameworks. To enable business–IT alignment, IT management studies emphasize the need for business involvement in IT decision making and particularly encourage active involvement of top management in ERP implementation. However, they overlook the role of BPM function in IT decision making. This is despite the fact that BPM studies suggest process roles to be accountable for business–IT alignment. In addition, although few BPM studies suggest IT involvement in BPM initiatives, BPG frameworks fail to include IT liaison positions in their structure. Consequently, the interdependencies between business processes and IT systems are not reflected in BPG and ITG.	This study further suggests the necessity of integration between BPM and IT management functions for enabling business–IT alignment. To support mutual adaptation and integrated design of business processes and ERP system, this study suggests the need for horizontal reciprocal integration between BPM and IT management functions at the operational level irrespective of the role of IT in the organization. The integration is enabled by including BPM and IT liaison positions respectively in the ITG and BPG structures and thus reciprocally integrating the processes for business process design and ERP configuration. The central BPM function should also direct strategic ERP decisions based on business strategy and BPM strategic initiatives, whereas IT managers' involvement in BPM strategic decisions depends on the role of IT and whether it is perceived as a strategic driver. By suggesting the enabling mechanisms integrating BPM and IT management functions, this study sheds more light on the governance capabilities required for managing the balanced approach for designing business processes and enterprise systems. By reinforcing the importance of system thinking for managing the design of business processes and IT systems, this study also suggests the inclusion of enterprise architects in design activities. This requires an EAM scope that not only covers IT components but also business capability elements as design variables. Consequently, the EA function should not only comprise IT architects, but also business architects who are situated on the business side of the corporation.

	Practical challenges	Theoretical challenges	Contribution of this PhD study
Method	Which methods promote consistent and integrated business process design in the course of a global ERP implementation?	Most methods for business process design are confined narrowly on business process modeling. Process-centric modeling approaches underrepresent systems structured around business processes and therefore cannot properly support consistent business process reengineering prior to or during ERP implementation in alignment with other enterprise architectural elements such as business strategy and IT components. By providing a multi-perspective approach, EAM can support consistent and integrated design of an enterprise as a whole; however EAM is still perceived as being primarily IT-focused and its application for BPM has not received much consideration in academia or practice.	This study clarifies the concept of EAM as a methodology that, by taking an integrated multi-perspective view, facilitates coherent and consistent design of an enterprise. However, the study indicates that applications of EAM in organizations differ depending on EA scope and thus the range of processes that EAM could be incorporated into. The study identifies three perspectives on EA scope among researchers and practitioners. EA scope may be limited to technical information components, may extend to cover elements realizing business capabilities, or extend even further to incorporate strategic business elements of an organization. Depending on the scope, EAM can be applied to complement processes for IT strategy formation, planning, and implementation; business strategy planning and implementation; or business strategy formation. For EAM to support business process design, EA scope should not only cover IT elements but also business capability elements as design variables. With such an extended scope, EAM can support consistent and integrated design of business processes and ERP systems in alignment with business strategy. By clarifying the different perspectives on EA and various applications of EAM in organizations, this study challenges the traditional view that limits EAM application to managing IT architecture design and evolution and introduces EAM as an approach with potential to facilitate consistent and coordinated management of complex business and IT asset landscapes. Furthermore, by proposing EAM as a method for supporting business process design and analysis, this study suggests that supporting alignment calls for a new perspective on BPM tools. To support alignment the BPM tool should provide a holistic understanding of an organization's EA rather than solely a process-centric view.

Table 5-1: PhD study's contribution to practical and theoretical challenges

5.2 Practical contribution

Good qualitative research captures how practitioners cope with situated problems and provides suggestions that may help participants develop normative principles about how to act (Tracy, 2010). Drawing on the answers to the research questions, this section discusses the practical significance of this PhD study by enumerating the BPM capabilities supporting and improving business process design in the course of a global ERP implementation in MNCs.

	Description

Alignment	• Business process design in the course of a global ERP implementation should take into account the criticality of process standardization for global ERP system complexity and integrative capability, and simultaneously the necessity of aligning process standardization with strategic, institutional, organizational, and relational contexts across the corporation. However, the bias should be in favor of process standardization to justify investments in a single-instance ERP and inherent downsides of technical integration.
	• Business process design — particularly the plan for process standardization — in the course of a global ERP implementation needs to be in line with the corporate international management strategy and consequent structural characteristics in terms of:
	  o Asset configuration: The plan for process standardization should be derived from asset configuration and the need for coordinating interdependencies across the corporation. Pursue process standardization when asset configuration follows a functional structure rather than a market-based structure. This will ensure that process standardization is value-adding by coordinating the resource interdependencies.
	  o Headquarters–subsidiary relationships: The plan for process standardization should be aligned with the extent of headquarters control over subsidiaries' strategic and operational decisions. Pursue process standardization when the headquarters has operational control over subsidiaries rather than financial control. This will ensure that process standardization will not provoke conflicts in headquarters–subsidiary relationships.

Governance	• Central permanent governance for management of business processes is essential for enabling business process design during and after the global ERP implementation.
	  o Corporate-level permanent process owners define, enforce, and maintain common process standards and make decisions about local deviations based on their criticality and inevitability.
	  o Central business process governance may include representatives from individual subsidiaries to reflect local requirements in business process design.
	• The central functions for BPM and IT management need to be horizontally and reciprocally integrated at the operational level to enable integrated design of the business processes and IT systems. The integration is enabled by including BPM liaison positions in the ITG structure and IT liaison positions in the BPG structure. The process roles direct the ERP system configuration based on business process requirements, whereas the ERP consultants influence business process design based on system capabilities and limitations. Process roles should also be involved in strategic ERP decisions to ensure their consistency with BPM strategic plans. Inclusion of IT managers in BPM strategic decision making depends on the role of IT in the organization.
	• To guide coherent and consistent design of business processes and ERP system, an EA function needs to be established. For EAM to facilitate business process design, EA scope should comprise not only IT components but business capability elements as design variables. The EA function should comprise both IT and business architects respectively situated on the IT and business sides of the corporation. Business architects assist process owners and managers with BPM decision making, and planning, developing, and controlling business process architecture design and evolution in alignment with business strategy and in integration with IT systems, including ERP.

Method	• Business process design in the course of a global ERP implementation can be facilitated by adopting EAM.
	  o EA business process modeling techniques facilitate acquiring, communicating, and validating requirements during the blueprinting stage of the global ERP implementation.
	  o EAM modeling and analytic techniques facilitate coherent and consistent business process design prior to or during the ERP implementation by providing a comprehensive understanding of business processes in conjunction with the organization's strategic elements, business capability elements, and IT components.

Table 5-2: BPM capabilities essential for business process design in the course of a global ERP implementation

The framework presented in Table 5-2 enumerates BPM alignment, governance, and method capabilities enabling the design of business processes in the course of a global ERP implementation in MNCs. As each capability represents a critical success factor for business process design, each element, sooner or later, needs to be considered by MNCs striving for success with global ERP systems.

5.3 Establishing BPM capabilities in GEA

In the course of this PhD study, I was involved in establishing BPM alignment, governance, and method capabilities to support and improve business process design activities when implementing a global ERP system in GEA. In this section, I briefly elaborate on the outcomes of our efforts for building these capabilities.

In addition to reducing the complexity of the global ERP implementation and operation, process standardization at GEA was aimed at one important objective: efficient coordination of interdependencies across affiliated subsidiaries. Although GEA's asset configuration did not represent a pure functional form, the corporate strategy for design and execution of turnkey projects had led to tight lateral interdependencies that were primarily managed by mutual adjustment among interdependent subsidiaries. Lacking efficient mechanisms to coordinate interdependencies among the subsidiaries, the global ERP program aimed at exploiting process standardization to improve collaboration across the corporation. However, my initial study of GEA suggested a poor fit between process standardization and the relatively decentralized corporate governance model. To reduce the conflicts in headquarters–subsidiary relationships, my recommendation and GEA's decision was to predominantly focus on standardization of business processes that facilitated interdependencies across the corporation.

However, GEA faced challenges standardizing those business processes. The abovementioned misalignment became evident during the blueprinting stage when GEA was developing its template of common process and data standards. To make decisions about the process standards, the global ERP program established a governance board comprised of business representatives from motivated and mature subsidiaries. The governance board was supported by a team of business process managers responsible for designing the global template. However, the governance board did not possess formal authority to make decisions about corporate standards and was even reluctant to do so, anticipating the potentially negative impact of process standardization on subsidiaries' performance. Given the research outcomes, I suggested replacing the members of the governance board with managers owning the business processes across the corporation. However, GEA had not appointed corporate-level process owners because according to the decentralized governance model, the individual subsidiaries were accountable for managing their business processes. Therefore, despite the fact that lateral interdependencies justified the process standardization effort, process standardization contradicted the headquarters' role as financial controller and subsidiaries' autonomy in coordinating their own activities. This imposed a major obstacle that hindered the process of building the global template.

Later, a major reorganization facilitated process standardization. To transform GEA into "one company," headquarters undertook an initiative to concentrate the dispersed decision-making authority and distributed assets. Indeed, the global ERP rollout is believed to have been a prelude for this transformation. The newly established corporate functions were given the responsibility to manage interdependencies across now even more interdependent subsidiaries, and therefore they were held accountable for managing business processes. This provided two opportunities. First, GEA started establishing a permanent BPM organization external to the global ERP program. Its purpose was to enable BPM organizations' involvement in other IT system implementation projects, and thus enable alignment across the design of IT systems. In addition, it would extend BPM function activities from designing business processes for IT system implementations to the wider range of BPM activities. Second, appointing corporate process owners and business process managers provided the possibility of replacing the business representatives in the global ERP program with individuals from the central BPM functions who had the

formal authority for defining and enforcing corporate standards. This move accelerated efforts for building the global template.

In addition to establishing alignment and governance capabilities, I was also involved in institutionalizing GEA's business process modeling capability. At the start, business process modeling in GEA faced the typical challenge faced in most organizations: it was criticized for being time consuming and without sufficient value (Rosemann, 2006). Therefore, GEA decided to use system demos for requirements engineering. However, as users' unfamiliarity with the ERP system hindered requirements collection and verification, GEA decided to establish business process modeling capabilities. Business process models not only facilitated requirements engineering, but also provided a ground for business process analysis in support of process standardization. However, the process-centric view to the organization could not sufficiently support business process design for two reasons. First, process models did not include representations of business strategic elements, and therefore could not support strategy mapping workshops where business process and IT capabilities were decided based on business strategic objectives. Second, business process models did not represent IT elements and therefore could not be deployed to illustrate ERP system boundaries and interfaces to other IT systems. This was especially important as the global ERP system implementation coincided with implementation of other IT systems that had to be integrated with the ERP system.

To resolve this issue, EA modeling was suggested. GEA acquired an EA tool and adopted an EA modeling methodology to provide a more comprehensive view of the organization to better support the business process design activities. This was the start of establishing EAM capability in GEA. To enable consistent design of business processes and IT systems, GEA is in the process of establishing an EA function comprising business and IT architects. While the business architects are responsible for guiding consistent business process design in alignment with business strategy, IT architects support IT managers with coordinated design and evolution of the IT architecture. Business and IT architects are also horizontally integrated to ensure aligned and integrated design of business and IT architectures.

5.4 Research limitations

Hopefully, this PhD study has provided interesting insights for the academic and practitioner communities; however, its contributions must be understood in light of inevitable limitations. Section 3.2.5 described the actions taken to improve validity of the five descriptive studies. This section discusses the validity of contributions in light of the study's limitations. The first set of limitations is imposed by the study's philosophical assumptions and practical execution, and researchers' potential biases.

- This study intended to provide an understanding of the capabilities that support and improve business process design in the course of a global ERP implementation. Having been grounded on the critical realism mindset, such intention was accomplished by exploring and explaining the structures and mechanisms that caused certain outcomes when designing business processes in the course of a global ERP implementation. The study had a particular focus on the causal impact of strategic and structural contexts, and the governance and methodological mechanisms that could support such efforts. While these structures and mechanisms may constitute a part of reality underlying the phenomenon, they do not describe or explain it holistically. BPM encompasses other types of capabilities that could influence the outcome of business process design activities such as IT systems that enable and support BPM activities, individuals and groups with BPM skills, and a BPM culture that incorporates collective values in regards to the process-centered organization. As it is not possible to cover the entire set of structures and mechanisms affecting business process design in the course of a global ERP implementation, this study's contribution should be viewed in terms of verisimilitude (van de Ven, 2007), that is, its ability to extend the existing body of knowledge.

- The problem definition, sense-making, and data collection and analysis processes in the course of this PhD study were highly influenced by the social context of the empirical settings I was immersed in. My values and prior experiences also potentially influenced data collection, my interaction with the individuals in the case organizations, the questions asked during the semi-structured interviews, my interpretations of interviewees' responses and actions, and my own observations and actions. Being the single researcher in the field also increased the likelihood of unintentional bias in my understanding and analysis of the experiences. However, the complementary data collection approaches, my co-authors' less subjective view of the empirical data enabled by their absence in the field, and the reflexive elaborations from research participants are believed to have facilitated feedback and confirmation loops.

- As one of the primary objectives of this collaborative PhD study was to improve the practice of business process design in the course of global ERP implementation in GEA, the research agenda was strongly dependent on the real-life problems faced in GEA. While my engagement in GEA provided me with the opportunity to gain first-hand experience, my intention to support GEA with establishing various BPM capabilities broadened the research scope. This limited the possibility of performing in-depth and repeated tests of the suggested propositions and designed capabilities. This limitation can be gradually overcome by expanding the study to encompass more in-depth case studies and thereby testing and refining the proposed theories.

- This PhD study relied on single- and multiple-case studies for theory building. While the exploratory and explanatory nature of the studies justifies the chosen methodology, the theoretical propositions need further investigation. In addition, case selection was constrained by accessibility issues, and therefore only Danish organizations and Danish-headquartered MNCs were included in this PhD study. As such, there is a possibility that results of the case studies could be biased towards the represented country. Using alternative research methods and repeating the same studies in cases embedded in different contexts could mitigate the limitations imposed by the single methodological approach and case selection.

In addition, there are other more specific limitations to the validity of answers to the research questions, caused by restrictions on execution of the study, especially lack of access to sufficient empirical data.

- The framework enumerating strategic, institutional, relational, and organizational factors influencing process standardization was developed by assuming these factors to be a subset of factors that impact formalization, convergence, and transfer of practices in organizations. The framework does not cover factors related to project management aspects of process standardization. Furthermore, I argued for the validity of the findings based on the fact that the framework was developed using already well-developed theories. While the framework was tentatively examined in the context of one MNC and secondary data, the internal and external validity could be further improved by conducting more case studies, especially in cases that represent diverse contexts. To further enhance the internal validity by controlling for bias and different perceptions toward process standardization, the framework needs to be assessed both at the headquarters and subsidiary levels.

- The implications of process standardization for global ERP architecture were investigated only by studying SAP ERP system. While the rather significant market share of SAP ERP in comparison with other ERP vendors justifies the choice of vendor, any extension of the findings to another ERP system requires a thorough study of the system and its product-specific characteristics that may influence the choice of its architecture. In addition, the study uses already well-established theories to explain the implications of process standardization for single-instance ERP architecture. However, it only relies on four key informant interviews to empirically assess findings from the literature review. Again further direct case studies could better enhance the internal validity of the findings. Furthermore, while the study proposes

that the bias should be toward process standardization to justify the choice of single-instance global ERP architecture, as the study does not operationalize constructs such as process standardization, ERP integrative capacity, and ERP implementation and maintenance costs, it could not assess how much process standardization is required to justify the choice of single-instance ERP architecture.

- The guidelines for aligning process standardization with MNCs' international management strategy and consequent structural characteristics are grounded on the assumption that MNC strategy can be classified into global integration and local responsiveness. However, MNCs may adopt different strategies and structures for various business domains and even subsidiaries to simultaneously achieve global integration and local responsiveness. I argue that the same propositions can guide decision making for process standardization in transnational MNCs. Still the validity of guidelines for such MNCs needs to be empirically evaluated. In addition, asset configurations and headquarters–subsidiary relationships are only two factors affecting process standardization in MNCs. In the real world, and as mentioned in paper I, process standardization efforts are influenced by many other structures and mechanisms. Investigating other factors such as project management, power relationships within the MNC, and cultural and institutional environment could provide equally valuable guidelines. In addition as these structures and mechanisms may influence each other's effects, the decision for process standardization needs to be in line with the sum of these structures.

- The study suggests permanent central governance for managing business processes as an essential capability when implementing global ERP systems. However, as an MNC's governance model may influence its approach toward BPG structuring, central governance for BPM may not be a feasible option in all MNCs. Further studies are required to explore associations between corporate governance model and BPG, and especially to investigate the feasibility of establishing centralized BPG structure in decentralized MNCs.

- Organizations adopt different approaches for structuring BPM and IT management functions, which in turn influence the integration between the two functions. The suggested governance mechanisms for horizontally integrating BPM and IT management functions are only valid in MNCs with centralized, mature, and distinct BPG and ITG arrangements. Corporate governance model and BPM and IT management maturity are potential factors that may influence the characteristics of BPG and ITG and thus the integration between BPM and IT management functions. In addition, while the study suggests the role of IT as the contingency factor influencing the direction of integration between BPM and IT management functions and argues for the validity of this finding based on logical reasoning, further studies, especially in organizations where IT actively drives the business strategy, are required to verify the guidelines.

- The EAM taxonomy elaborated on various perspectives of EA and EAM applications in MNCs. However, resource limitations restricted the opportunity for characterizing the three archetypes in terms of EA function makeup, its integration into organizational governance, and professional and personal competencies of enterprise architects. As a result, the study could not provide detailed guidelines for integrating EAM and BPM functions in support of consistent business process design. The study's suggestion for including business architects in a BPM center of excellence is only based on a comparison of the service portfolio of the two functions and was not empirically examined.

5.5 Opportunities for future research

This study has explored and explained only selected aspects of BPM capabilities supporting and improving business process design in the course of global ERP implementations. As research in BPM capabilities is still in its infancy, there are several topics to explore in future research endeavors. This section presents a set of potential directions for future research.

Regarding alignment, this PhD study provides a holistic overview of strategic, organizational, institutional, and relational factors that may influence business process design, and in particular process standardization, across an MNC's subsidiaries. However, while seeking causal explanations, this study limits its scope to MNCs' strategic and structural context and their impact on process standardization. This encourages future studies to further explain the association between process standardization and social and organizational contingencies of an MNC and develop guidelines for alignment. Moreover, further studies are required to investigate BPM people and culture capabilities and how these capabilities can be used to overcome difficulties in business process design caused by multiplicity of institutional and organizational contexts across an MNC.

While ITG has been heavily examined for almost two decades, BPG has received significantly less attention from academia, despite the substantial number of studies on BPM. Although BPG should cover both accountability and decision-making processes for guiding desirable process actions, the relative few studies on BPG only focus on structural mechanisms, leaving process mechanisms underexplored. Research becomes even scarcer when considering BPG in a global context. This PhD study showcased the structure of a BPM function in an MNC in support of business process design and also proposed governance mechanisms that could enable integration between BPM and IT management functions. Future studies could explore the BPG structural, process, and relational mechanisms, particularly in the context of MNCs. A revision of the already suggested structural mechanisms is required to enable including enterprise architects and IT roles in BPM activities. There is also a need to specify the governance processes that formalize and institutionalize BPM decision making and monitoring procedures in line with business strategy and IT. Further studies are as well required to explore the association between corporate governance and BPG. There is also a need for new insights into job specialization between global and local BPM functions in an MNC along the BPM life cycle, namely process design, implementation, execution, and monitoring and control.

EAM is predominantly deployed to support enterprise-wide management of IT architecture design and evolution. This PhD study challenged this limited view and identified three perspectives on EA scope and EAM application among researchers and practitioners and suggested a trend for advancing EAM applications in organizations. While organizations may initially adopt EAM to support IT management processes, as the EAM concept becomes more mature, its applications are extended to complement business strategy planning and implementation processes and further to support business strategy formation. More in-depth studies are required to characterize the three suggested archetypes in terms of EA function makeup, its integration into organizational governance, and professional and personal competencies of enterprise architects. Eventually these characteristics can be used to enhance and extend the maturity models for assessing EAM capability. In addition, while the case studies indicate that organizations seek different goals by adopting EAM, more detailed studies are needed to investigate contingency factors that influence organizations' use of EAM.

5.6 Concluding remarks

The rate and scope of economic globalization has intensified over the past half century. As globalization is closely related to integration and control, investments in global ERP systems are typically carried out as a part of the globalization process in MNCs. Global ERP systems support integration and control in MNCs by providing the technological capability for collaboration and communication, and by enabling establishment of a common language across MNCs. Indeed, process and data standardization is among the primary drivers of ERP consolidation efforts in MNCs. This PhD study intended to fill some of the gaps in the extant literature on global ERP implementations and managing business process design activities in MNCs by clarifying the criticality of business process design in the course of a global ERP implementation and by proposing a set of BPM capabilities that support and improve such endeavors.

Using the findings from five descriptive studies, this PhD study answered three research questions. First, drawing on a comprehensive literature review, this study contributed to an enhanced understanding of the strategic, institutional, organizational, and relational factors that influence business process design, and in particular process standardization, in MNCs, and clarified the implications of process standardization for global ERP architecture in terms of its integrative capability and total cost of ownership. Second, to enable alignment in support of business process design, the study specifically focused on associations between process standardization and an MNC's international management strategy and proposed guidelines for fitting process standardization with asset configuration and headquarters–subsidiary relationships. The study then shifted its focus towards the governance mechanisms that support business process design in the context of MNCs and suggested permanent central BPG as an essential capability for supporting business process design during and after a global ERP implementation. The study further clarified the necessity of horizontal integration between the central BPM and IT management functions in support of business–IT alignment, and proposed governance mechanisms that enable integration at the strategic and operational levels. Third, seeking methods that can improve business process design activities, the study further investigated various perceptions of EA and EAM applications in organizations. By reinforcing the importance of system thinking for managing the design of business processes and IT systems, the study proposed EAM as a methodology for enabling integrated design of business processes and IT systems in alignment with business strategy.

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7 APPENDICES

PAPER I

Global ERP implementations and harmonization of practices in multinational corporations

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Global ERP Implementations and Harmonization of Practices in Multinational Corporations: A Conceptual Framework

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ABSTRACT

Multinational corporations have been at the front of the ERP movement since its origins. The globalization of markets had a profound effect on multinational corporations' IT strategies, including ERP systems, to facilitate supporting the global outlook. Despite the increasing growth of global ERP systems, the focus of research has been mostly on the intra-organizational aspects. Implementation of ERP systems in multinational corporations is considerably more difficult due to the presence of different business actors and their heterogeneous interests influenced by the local strategies and context. Inspired by the social and economic theories explaining standardization, convergence and transfer of practices in a network context, this study is intended to provide a descriptive and explanatory framework of factors decisive for harmonization of practices during global ERP implementation in multinational corporations. The framework is tentatively verified based on the secondary data as well as a case study conducted in a multinational corporation.

Keywords

Global Enterprise Resource Planning Systems, Harmonization, Multinational Corporations

INTRODUCTION

The increasing business trend towards globalization has increased the popularity of Enterprise Resource Planning (ERP) systems among multinational corporations (MNCs) as a tool to control and coordinate the remote operating units and to improve efficiency, predictability, transparency and visibility across the enterprise. Instead of accommodating individual business units' processes and requirements through separate multiple ERP systems, corporations are aiming at reducing complexity and cost by developing corporate-spanning ERP strategies. Using ERP systems as a tool to create a common language across the operating units, global consensus is required (Holland and Light, 1999). This has proved to be difficult to achieve due to the differences in the local criteria, infrastructures, business processes, semantics of data, authorization hierarchies, and decision centers (Daneva and Wieringa, 2005).

Using a single logical database to facilitate transactions and information exchange across the business units, a global ERP necessitates standardization of data and business processes (Gattiker and Goodhue, 2004). Often a conflict arises between local requirements on the one hand and the enterprise-wide objective to introduce common global business processes on the other hand. While harmonization has been one of the main drivers of global ERP system implementations in MNCs, the challenges for reaching a global consensus among corporate subsidiaries about the unified ways of working have not been sufficiently addressed. There are few studies which discuss the fit between global ERP and organizational factors such as international management strategy, competitive strategy, interdependence and differentiation and organizational structure, among which can be mentioned the studies by Benders, Batenburg and Blonk (2006), Clemmons and Simon (2001), Gattiker and Goodhue (2004, 2005), Madapusi and D'Souza (2005), Markus, Tanis and van Fenema (2000), Morton and Hu (2008), and Yen and Sheu (2004). Based on an extensive literature study and using different theoretical points of view, we propose a descriptive and explanatory framework incorporating the factors decisive for harmonization of practices in MNCs while implementing a global ERP system. For verification purposes, the framework is tentatively applied in the context of a corporation in the process of harmonization of its practices along with a global ERP implementation.

The remainder of the paper is organized as follows: The theoretical framework and research question formulation are followed by a description of the harmonization framework's elements. A brief description of the framework application to the secondary data and the findings of the empirical study follows and the paper is concluded with a discussion of implications and potential extensions of the research.

THEORETICAL FRAMEWORK

Kostova (1999) defines organizational practices as taken-for-granted institutionalized ways of conducting organizational functions that have evolved over time under the influence of an organization's history, people, interests, and actions. They are habitualized actions, routines, and standard operating procedures that reflect an organization's shared knowledge, competences, values, and beliefs embedded in individual skills and collaborative social arrangements. Organizational practices are suggested to consist of different elements, including a set of rules and cognitive understanding of how a particular organizational function should be conducted (Kostova, 1999).

Uncoordinated business processes with isolated business units constantly re-inventing the wheel are not desirable in any organization. The cost of variations may take the form of customer dissatisfaction, inefficiency, ineffectiveness, costly training, more variations in documentation, lack of comparable information for decision-making, loss of best practices, increased complexity, higher staffing costs and more costly IT development and support (Tregear, 2010), while process harmonization across operating units is expected to lead to better communications, more efficient handoffs and performance benchmarking, and enabling implementation of uniform information systems (Davenport, 2005). Though Levitt (1983) believes that the days of national and regional preferences are gone and that there is a convergence in commonality, there are studies which point to the differences in the way of doing business in MNCs as a result of differences in national culture, management style, politics, regulations, customs, market requirements etc. (e.g. Sheu, Chae and Yang., 2004). Harmonization of business processes and organizational structures in multinational organizations requires a common understanding of the future business, which may be hampered by communication problems and different priorities and habits, and may even be completely blocked by political conflicts and prestige (Gulla and Mollan, 1999). Moreover, adapting business processes to a global template does not necessarily yield the same benefits across the local subsidiaries of a multinational (Carton and Adam, 2003). Therefore, a fundamental question remains for MNCs as how much uniformity should exist in the way it does business in different regions or countries (Davenport, 1998).

Though the terms harmonization and standardization are often used interchangeably, in this paper the term process standardization refers to the process of reducing process randomness, while harmonization of practices is used to refer to the process of unifying diverse corporate processes into a global template. In other words, harmonization is defined as the activity of establishing a limited set of solutions for the parties involved and balancing their requirements (Rosenkranz, Seidel, Mendling, Schaefermeyer and Recker, 2010). Subsequently, the level of harmonization of a set of business processes refers to the degree of commonality that is achieved between different process variants (Remco, 2012) or the extent to which subsidiaries perform the same practices the same way. Assuming the factors influencing harmonization of practices in MNCs as a subset of factors influencing standardization, convergence and transfer of practices across an enterprise, the papers relies on social and economic theories to provide a conceptual framework answering the following research question: What are the factors and conditions which influence harmonization of practices in an MNC while developing the template for a global ERP roll-out?

In the following, an overview of the factors that influence standardization, convergence and transfer of practices within MNCs and thereby the process of harmonization for global ERP implementations is provided. Figure 1 provides an overview of the proposed harmonization framework. Since harmonization is considered to be relatively faster than a gradual process of dissemination, the framework excludes those factors which describe slower forms of convergence and transfer, e.g. mechanisms applied for gradual organizational learning such as administrative devices to stimulate vertical and horizontal integration to facilitate knowledge flow.

CHARACTERISTICS OF THE MULTINATIONAL CORPORATION

Organizational form and capabilities and strategic profile of an MNC are shaped by technical and economic rationality, constraints in resource allocation, cognitive orientation of managers and social and institutional structure of the environments (Ghoshal and Bartlett, 2010). In the following some characteristics of an MNC are discussed that influence inter-organizational convergence and transfer of practices, and are suggested to affect harmonization of practices for global ERP implementations.

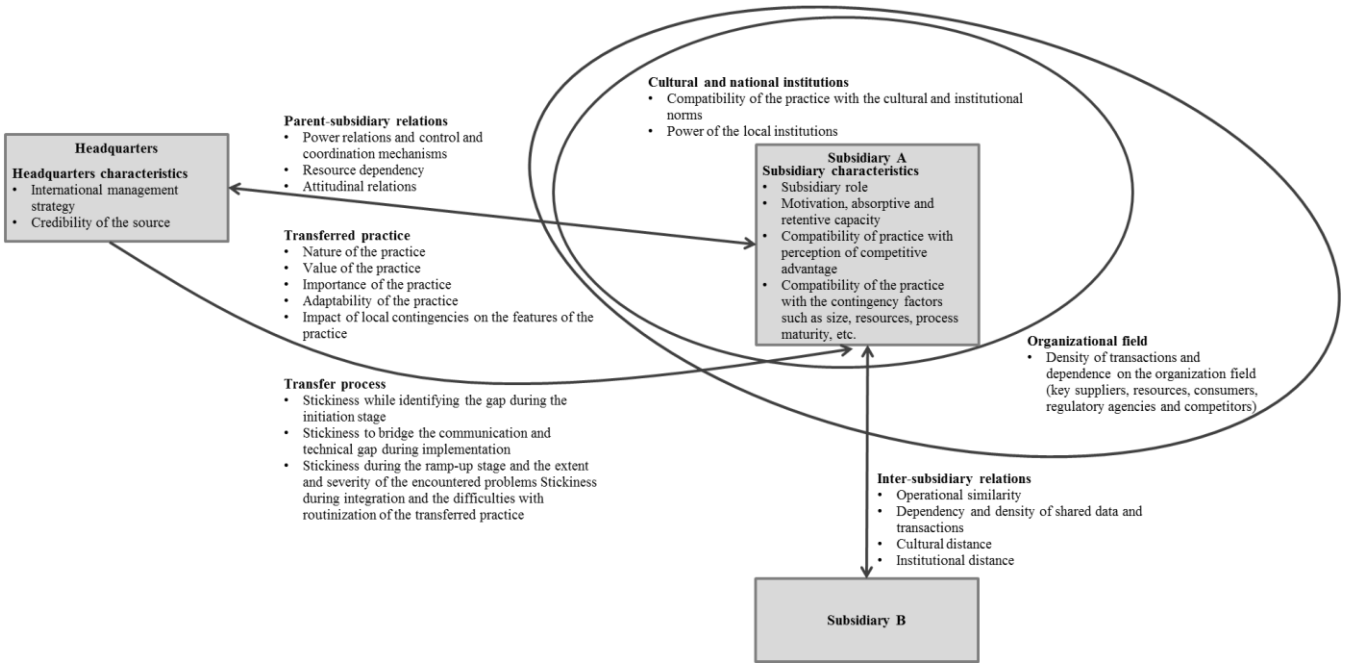

Figure 1: Framework of factors influential on harmonization of practices in MNCs

International Management Strategy: Bartlett and Ghoshal (1998) introduce a widely used framework describing the strategic disposition of MNCs. Based on the relative importance of global efficiency and local responsiveness, the framework introduces a typology for international strategy of MNCs, categorized as global, international, multinational and transnational organizations. While the multinational strategy is based on building local presence through allowing for sensitivity and responsiveness to national differences, the global strategy is driven by the need for global efficiency and cost advantages through centralized strategic and operational decision-making and global-scale operations. The need for worldwide coordination in global companies to exploit scale economies encourages adoption of common practices across subsidiaries (Cavusgil, Yeniyurt and Townsend, 2004), while isomorphism with local patterns are stronger in multinational strategies to ensure responsiveness.

Resource Dependency: According to resource dependency theory an organization's structure reflects the need to manage uncertainty related to importing resources from the environment. Using this to predict the structure of subsidiaries in different MNCs, Rosenzweig and Singh (1991) suggest that the subsidiary of an MNC in a multi-domestic industry, in which there are independent competitions in the countries, may strongly resemble other host-country firms due to its relatively higher dependence on local resources, while MNC subsidiaries in global industries, where scale economies are paramount, may exhibit a higher degree of interdependence with the parent and other subsidiaries within the MNC, leading to more complete manifest of the corporate features. Underlying these hypotheses is the assumption drawn from institutional theory, that resource exchange between organizations generates isomorphic pulls on the dependent organization to gain the legitimacy required to access resources (Westney, 2010).

Control and Coordination: Rosenzweig and Singh (1991) suggest that the tendency for subsidiaries of an MNC to resemble each other is due to two factors: organizational replication and the imperative of control. The process of replication and the need for consistency within MNCs is driven by the similarities in their technologies and the ambiguity and uncertainty of the foreign country. The challenges of establishing and maintaining control within MNCs compared to domestic firms explains the importance of control and coordination mechanisms in MNCs. A higher level of control from headquarters is expected to increase the potential for similarity and convergence of practices across MNCs (Kostova, 1999). The more the strategic decision-making approach is decentralized, the higher the freedom of local subsidiaries for bottom-up development of local strategies, idiosyncratic power resources and local practices (Geppert and Williams, 2006). However, looking at an MNC as a network of organizations rather than a unitary organization, a differentiated approach for application of control mechanisms - including formalization through standardization of work processes - might be needed to fit the heterogeneous task environments of subsidiaries, the local resources and the complexity and dynamics of the local environment (Ghoshal and Nohria, 1989; Mintzberg, 1983).

Inter-subsidiary Operational Similarity and Interactions: Ross, Weil and Robertson (2006) suggest the level of standardization of business processes to be determined by the degree of operational similarity of the business units, while the level of integration of business processes should be decided considering the degree of shared data and transactions across a corporation. Common products and process technologies suggest a similar type of work organization (Mueller, 1994) while any differences in products and services may necessitate variation in the associated processes (Tregear, 2010). Standardization across heterogeneous sub-units may result in either design or compromise costs (Gattike and Goodhue, 2004), since it is less likely that standardization will meet all units' requirements equally well (Gattiker and Goodhue, 2005).

In addition to strong isomorphic pulls across an MNC's subsidiaries, efficiency and transaction cost grounds also prescribes similarity of the interacting units (Westney, 2010). High interdependence, resulted from high degree of information and material exchange between the business units, justifies the need for a common formalized language (Gattike and Goodhue, 2004) to reduce the transaction costs (Westney, 2010). However, the value of an integrative coordination mechanism in one subsidiary depends on its interdependence to other corporate units (Gattiker and Goodhue, 2005).

Quality and Types of Relations: The ease of communication and the intimacy of the overall relationship between the source and the recipient in a transfer process may affect the number of attempts to transfer knowledge and the outcome of those attempts (Szulanski, 1996). Szulanski (2003) has suggested that stickiness is more likely to occur in case of an arduous relationship between the recipient and the source of knowledge. Kostova (1999) also considers two types of relationships important in the context of practice transfer: attitudinal and power dependence relationships. She proposes three types of attitudinal relationships, namely the transfer coalition members' commitment to, identity with, and trust in the parent company, influential on the motivation for and success of a transfer process. Similarly, we suggest the quality of relations between the headquarters and the subsidiaries of an MNC to influence acceptance of the harmonized solution imposed by the headquarters.

CHARACTERISTICS OF THE SUBSIDIARY

Alternative to the views considering an MNC as a unitary organization is the view which regards it as a set of differentiated structures and processes that reside in the many subunits of an organization. Conceptualization of an MNC as a differentiated network highlights the diversities among the subsidiaries caused by the differences in resources, business context, history, type of establishment etc. (Andersson, Forsgren and Holm, 2002). In the following, we discuss those subsidiary characteristics, which are suggested to impact harmonization of practices for a global ERP implementation.

Cultural Environment: Organizational practices are suggested to vary across countries due to the differences in the sociocultural environments in which they have evolved and are used. The cultural distance between home and host countries of a practice has been argued as a factor influencing the success of its transfer (Kostova, 1999). Nevertheless, there is believed to be a practice-specific effect of local unit organizational culture. The compatibility between the values implied by a particular practice and the underlying values of an organizational unit is expected to be influential on the success of transfer (Kostova, 1999).

National Institutions: The national business systems approach widens the scope by considering a broader range of institutional factors at the national level, rather than culture, which influence standardization (Tempel and Walgenbach, 2007). National institutional arrangements influence companies' strategies and organizational practices to reflect typical national patterns in companies' structures and processes (Muller, 1994). Therefore, a transfer success is suggested to be negatively correlated with the institutional distance between the home and host countries, since the differences in the national institutional characteristics may cause misfits between the transferred practice and the recipient's environment (Kostova, 1999).

However, Gamble (2010) states that not all institutions are equal: while some norms might be easily ignored, others are deeply embedded. In addition, not all elements of an organization are influenced or affected equally by the national institutions (Rosenzweig and Singh, 1991). There are as well country-level effects on the success of transfer, where some countries provide relatively more favorable environments for transfer of certain practices (Kostova, 1999), while implementation of global best practices are more limited in units situated in highly integrated national systems (Geppert and Williams, 2006).

Organizational Field: Survival of an organization depends on its compliance with the institutionalized expectation of its environment and organizational field incorporating key suppliers, resources, consumers, regulatory agencies and other organizations involved in the same products and services (Tempel and Walgenbach, 2007). Andersson et al. (2002) by studying the subsidiaries of MNCs in relation to their external networks of suppliers and customers conclude that high density of customer-supplier relationships between a subsidiary and its external network and over-time extension of arm's-

length relationships to relationships based on adaptation and trust will usually lead to adaption of partners' behavior to each other in terms of business routines, planning systems, information etc.

Subsidiary Role: Looking at MNCs as networks of organization, several dimensions are used to differentiate between the diverse strategic roles of the subsidiaries in a corporation. Amongst all can be mentioned level of local resources, relative environmental complexity (Ghoshal and Nohria, 1989), strategic importance of the local environment, firm-specific competences (Bartlett and Ghoshal, 1986), foreign direct investment type (Rugman et al, 2011), resource configuration, market, product, and value-added scope (Birkinshaw and Morrison, 1995), magnitude and direction of transactions (Gupta and Govindarajan, 1991; Ghoshal and Bartlett, 2010), strategy for integration and localization (Jarillo and Martinez, 1990), and subsidiary's control of critical linkages with key local actors (Ghoshal and Bartlett, 2010). The strong strategic position of a subsidiary and its satisfactory performance within an MNC may have implications for the parent-subsidiary relations and might provide the subsidiary with the bargaining power to protect local expertise and work processes and to resist the imposition of a centralized approach for global standardization of local practices (Geppert and Williams, 2006).

Perception of Competitive Advantage: Gamble (2010) highlights the context-specific, firm-level perceptions of sources of competitive advantage as the key motive encouraging transfer of parent company practices. Such perceptions are suggested to be context-specific, dependent upon the history and experience of individual firms, and mediated by diverse factors including parent company experience and the relative economic development of the parent and the host countries. Therefore instead of the generic notion of best practice, competitive advantage should be considered context-dependent with preferences based on assumptions, hunches and subjective judgments as much as objective factors. In addition, research on subsidiary initiatives have indicated that individual subsidiaries can benefit from some diversity of practices within an MNC by having the opportunity to imitate leading local or global competitors to respond to conditions in the host country (Cheng and Yu, 2012).

Motivation, Absorptive and Retentive Capacity: The level of motivation of the recipient to accept knowledge from the outside and its absorptive and retentive capacity are the characteristics which influence the success of a transfer process (Szulanski, 1996). The ability to exploit outside sources of knowledge is suggested to be a function of the prior level of related knowledge. Lack of absorptive capacity is an impediment to recognizing the value of knowledge and consequently knowledge recreation and implementation, especially when it comes to person-embodied technologies (Kostova, 1999; Szulanski, 2003). On the other hand, institutionalization of the transferred knowledge and its long-term retention depend on the recipient's retentive capacity (Szulanski, 2003). Therefore, organizational culture and cultural orientation of the subsidiary towards learning, innovation and change will influence the success of practice transfer, irrespective of the practice being transferred (Kostova, 1999).

CHARACTERISTICS OF THE PRACTICE

The practices exercised in overseas subsidiaries of an MNC are usually a hybrid of both country of origin and host country practices, as well as adaptations and innovations. Therefore the necessity to trace and analyze each practice separately, rather than treating organizational practices as a discrete whole, is highlighted by Gamble (2010). In the following some characteristics of a practice that influence its standardization and transfer and consequently, as we suggest, its harmonization are discussed.

Nature of the Practice: The nature of a process influences its standardization potential (Rosenkranz et al., 2010), and consequently the success of any attempt for reduction of its variety across an MNC. Lillrank (2003) classifies processes under three categories: standard, routine and non-routine processes. While some processes are knowledge-intensive and creative, some are mass-customized or automated. Management of a process needs to fit its degree of variability. While standard processes can be controlled by specifications, manuals and automation, tools for control of routine processes are limited to guidelines, repertoires, and checklists, and non-routine processes can only be controlled through shared values, competences and resources (Rosenkranz et al., 2010).

Local Environment Influence on the Practice: Leijen (2005) associates unique features of a process to its unique environment, which imposes requirements and changes on it. Product features, value discipline, customer binding, size, asynchronicities in process innovation cycles and complexity reduction efforts are suggested as the factors influencing local differences in processes. In addition differences in the resource level may also delimit harmonization as what works in one location may not be possible in another if the necessary resources are not available or affordable (Tregear, 2010).

Value of the Practice: Causal ambiguity, defined as the ambiguity of the reasons for success or failure in replicating a capability in a new setting, and unproveness, referring to knowledge without a proven record of past usefulness, have been identified as the characteristics of a practice that influence the success or failure of its transfer (Szulanski, 1996). The uncertainty about the value of a practice is expected to increase when transferred to a foreign subsidiary, since much of its

perceived value is socially derived (Kostova and Roth, 2002). In addition, some researchers have suggested that those activities with an unclear link to the overall performance are more likely to be subject to institutional pressure and thereby isomorphism pressure to resemble the structure and processes of the leading organizations in the field, compared to those practices for which there are not clear performance indicators (Westney, 2010). Therefore corporate-wide adoption of unproven best practices for ill-understood operations is expected to be challenging.

Local importance of the Practices: Leijen (2005) considers process standardization as the process of knowledge decontextualization. Replacing local differences with best practices is expected to increase efficiency and effectiveness when the local differences in process structure have only historical significance. Conversely, process standardization may damage competitiveness when local differences are due to unique commercial propositions.

Adaptability of the Practice: The difficulty of implementing best practices is adapting them to local circumstances (Leijen, 2005). Knowledge development is considered to be context-specific, or even relation-specific. The more context-specific the solutions created in one subsidiary, the more difficult it is expected to apply the same knowledge in the business context of another corporate unit (Andersson, 2003). Rugman, Verbeke and Wenlong (2011) similarly divide subsidiary competences into location-bound and non-location-bound competences. While non-location-bound firm-specific advantages can be exploited globally to take advantage of benefits of scale, scope and national differences, location-bound firm-specific advantages require substantial time to be developed, can be exploited only in a particular location to provide the firm with local responsiveness (Rugman et al., 2011), and their transfer to other locations require significant adaptation (Rugman and Verbeke, 1992).

CHARACTERISTICS OF THE TRANSFER PROCESS

Szulanski (1996) defines a transfer process as a dyadic exchange of organizational knowledge between a source and a recipient in which the identity of involved parties matters. Organizations have more difficulties implementing best practices than choosing them (Leijen, 2005). Szulanski (2003) analyzes the process of transfer by breaking it down to four phases: initiation, implementation, ramp-up and integration. In accordance with the four phases, he suggests a typology of stickiness, defined as the difficulty of knowledge transfer inside a firm. In the following the different types of stickiness and their predictors in different stages of a transfer process is described.

Initiation Stickiness: Initiation stickiness is defined as the difficulty to recognize opportunities to transfer and in acting upon them. The transfer will not be initiated unless a gap and knowledge to address the gap are found within an organization. This is expected to be challenging in case of source unreliability, ill-understood operations, and causal ambiguity and unproven value of the transferred practice (Szulanski, 2003). Similarly, a harmonization process is suggested to be more challenging to initiate in case of causal ambiguity and unreliability of the source of practice.

Implementation Stickiness: During the implementation phase, when the exchange of information and resources between the source and the recipient occurs, stickiness depends on challenges to bridge the communication gap between the involved partners and to fill the recipient's technical gap. Assuming the source motivated enough, the success of this stage highly depends on the quality of the relations between the source and the recipient and the motivation of the recipient to overcome disruptions in the operations (Szulanski, 2003). This is suggested to hold as well in the context of harmonization.

Ramp-up Stickiness: At the ramp-up stage, when the recipient starts using the acquired knowledge, the eventfulness depends on the number and significance of unexpected problems and the effort needed to solve them. The problems may occur as a result of incompatibility between the transferred practice and the new environment, inadequate training, and resources leaving the organization. The difficulty during this stage is expected to correspond to causal ambiguity of the practice and the absorptive capacity of the recipient (Szulanski, 2003).

Integration Stickiness: The success of a transfer process is defined as the degree of institutionalization - implementation and internalization - of the practice at the recipient (Kostova, 1999). During the integration phase, the risk of abandoning the transferred practices depends on the effort required to routinize them and to remove obstacles caused by external and internal events such as environmental changes, arrival of new members, emergence of superior alternatives, individual lapses in performance, unmet expectations, dysfunctional consequences, sudden changes in the scale of activities etc. The institutionalization success is suggested to depend on the recipient's retentive capacity (Szulanski, 2003). High uncertainty about a practice and its value combined with high pressure for its adoption from the legitimating environment is expected to result in ceremonial adoption, which is suggested to be particularly likely in the case of a subsidiary (Kostova and Roth, 2002). Similarly, ceremonial adoption of a harmonized solution may result in use of alternative solutions and workarounds to bridge the gap, bypassing the unified way of working.

The proposed harmonization framework is supported with the help of real cases exemplifying some of the factors mentioned above. The cases along with the identified factors are presented in Table 1.

Author	Firm	Harmonization issue	Identified factor
Barry and Sikorski (2008)	A healthcare multinational corporation	The global ERP implementation was abandoned due to the different motivations of the headquarters and local subsidiaries. The strategic and operational benefits of standardization and ERP system were questioned by the local subsidiaries and perceived as a trade-off for the lost customization, and overemphasis of the systems' importance rather than business fundamentals.	Perception of competitive advantage
Gattiker and Goodhue (2004)	Multinational manufacturer of construction material	Standardization led to deficiencies in one of the plants that, unlike other plants, manufactured a wide-variety of non-standard products that required a different set of processes.	Operational similarity
Geppert and Williams (2006)	a Finnish multinational corporation	There were difficulties transferring the global operating model to the German subsidiary due to the subsidiary's important strategic position, outstanding economic performance and high degree of institutional embeddedness in the host country. The global model was perceived a threat to skills and jobs, and the subsidiary's expertise. The headquarters decided to maintain the local processes of the German subsidiary to preserve the host-country advantages.	Subsidiary role, National institutions, Nature of the practice, Initiation stickiness
Grant (2003)	Multinational corporation, leading in specialty metal products	One of the causes of resistance in winning the buy-in of senior corporate and business unit managers identified as the misalignment between the centralized IT execution model and the decentralized business operating model of the corporation.	Control and coordination
Hepsø et al. (2000)	Statoil	There have been almost as many designs as implementation projects, due to the diversity between the units, their existing organizations and their lack of trust in the central team practical experience. The new regime planned for geographical divisions were the core areas are self-supported with all competence needed independent of the centralized staff.	Control and coordination, Source-recipient quality of relations, International management strategy
Markus et al. (2000)	Multinational manufacturer of telecommunications and power cables	Several years were spent in consensus-building before beginning the implementation as the changes brought by the central configuration were perceived to be excessive by the similar but autonomous units that used to have control over technology decisions	Control and coordination
Markus et al. (2000)	Kraft Foods	The one-size-fits-all ERP system did not work for the corporation as a diversified manufacturer.	Operational similarity
Sheu et al. (2004)	Hydro Agri Europe	National and cultural differences led to differences in the business processes and local requirements, which subsequently necessitated local ERP implementations rather than a global system.	Cultural institutions, National institutions
Sheu et al. (2004)	Multinational computer manufacturer	The U.S. facilities refused to adopt the ERP software configuration requested by the headquarters due to the differences in its operating processes partly caused by the culture and regulatory environment.	Cultural institutions, National institutions
Worthen (2002)	Nestle	The ERP rollout collapsed into chaos and faced major resistance from the workers and divisional executives, mainly due to the lack of understanding of the new processes. Nestle had to restart the project.	Absorptive capacity, Implementation stickiness

Table 1: Real cases exemplifying the harmonization framework

EMPIRICAL STUDY

The framework was tested in the context of an engineering MNC in the process of business harmonization and consolidation of ERP systems across more than 50 subsidiaries. The firm is a conglomerate of gradually acquired companies specialized in the design and development of process solutions. To identify the encountered issues while setting the harmonization strategy, a series of semi-structured interviews were arranged with the CEO's assistant, the CIO who functions as the program director, and the six global business process councils coming from the pilot subsidiaries who, in the context of the global ERP project, play the role of owners of the main functional areas and are responsible for formulating the harmonization

strategy. The interviews' transcripts were coded and analyzed based on the proposed framework and since the space limitation does not allow for any detailed description, only a summary of the findings is presented in Table 2.

Factors	**Remarks from the interviews**
Internatioanl Management Strategy	Different perceptions of the IT and business people regarding the future international business strategy - specifically potential disposition along the local responsiveness-global efficiency continuum - has led to different opinions about the harmonization strategy, and different expectations of its potential benefits and its implications for the resource configuration.
Control and Coordination	Different perceptions of the IT and business people regarding the control and coordination mechanisms - specifically formalization and centralization of decision-makings compared to the existing decentralized structure - has led to different opinions regarding the harmonization strategy and its implications for the local autonomy, and the strategic and operational responsibilities at the headquarters and subsidiary levels.
Ressource Dependency	-
Inter-organizational Operational Similarity and Interactions	The operational similarities among the subsidiaries have been a factor encouraging harmonization, however integration has been taken for granted without any investigation into its potential side-effects. The program director expects the differences in the subsidiaries' density of interactions with the sister companies to influence the harmonization benefits and the subsidiaries' willingness to conform to the common ways of working. The value of harmonization was questioned by some of the business process councils who, despite the common belief, did not find the subsidiaries operationally similar enough to encourage consolidated decision-making enabled by harmonization.
Type of Relation	-
Cultural and National Environment	While the national institutions, especially the legal legislations in the emerging markets, were mentioned as impediments to harmonization, the implications of cultural differences were not emphasized.
Organizational Field	Except for the emphasis on local responsiveness and local value creation for local customers, the density of interactions with the external network, especially suppliers, was not stated as a burden of harmonization. Though some preferred trading with local vendors over a central vendor when it comes to commercial common standard parts.
Subsidiary Role	There is expected to be higher resistance from the larger subsidiaries, those in the possession of technology and those with better performance. While the strategic importance of a market was mentioned to influence the subsidiary's importance, its potential implications for harmonization was not clear. The density and direction of transactions were mentioned to influence the publicity of a subsidiary role.
Perception of Competitive Advantage	Making a subsidiary, especially the mature ones, accept a harmonized solution, developed for many, is expected to result in lower efficiency and lower competitiveness. There was also a high focus on the importance of local knowledge.
Subsidiary's Motivation	Harmonization challenges were expected to be different in the subsidiaries depending on the local company's openness to change, bought-in to the vision, the magnitude of the change in that subsidiary, and its perception of loss of control.
Nature and Importance of the Practice	The majority saw higher potential for harmonization of back-office and administrative processes compared to front office processes. Standardization of processes associated with standard components was also considered more feasible, while harmonization of core value creation processes were not found attractive.
Local Environment Influence on the Practice	The level of complexity of a subsidiary as a function of its size, functional scope and product portfolio are pointed as influential factors for harmonization. Harmonization in those subsidiaries with more mature IT systems and business processes was also expected to be a step-back while it may result in a higher level of complexity in less mature subsidiaries.
Value of the Practice	There were concerns about the superiority of the new processes over the existing ones. The program director considered communication of potential benefits and increasing their visibility to the local companies vital for the project success.
Practice Adaptability	-
Initiation Stickiness	Emphasizing on the importance of local knowledge, some signs of not-invented-here syndrome could be seen in the business process councils who were not convinced of having their practices defined by others, though some other saw it as an opportunity for improvement.
Implementation Stick.	-
Ramp-up Stickiness	-
Integration Stickiness	-

Table 2: Coding of the interviews' data based on the harmonization framework

Since the company was at the initial stages of the project, it could not provide the possibility to identify all suggested factors, especially those associated with the transfer process. However, the study indicated the influence of factors such as international management strategy, inter-subsidiary similarity and dependency and intended control and coordination mechanisms, decisive for justifying the harmonization initiative. Furthermore, the difficulties of achieving consensus about the harmonized solution could be explained by other factors including the nature of the practice and its value and importance,

national institutions, and the subsidiaries' role. Though there was an emphasis on responsiveness towards the local customers, any potential impact of suppliers on the local practices was not highlighted. Furthermore, assuming integration taken-for-granted, the interviewees did not seem to be concerned about the potential drawbacks of the resulted tight-coupling. Moreover, despite the high emphasis of the previous studies on the significant role of cultural distances in global ERP implementations, the sociocultural differences across the enterprise were not mentioned as a burden of harmonization.

Though the empirical study was helpful in making sense of the framework in a real case, it could not verify the entire set of suggested factors. However the influence of the disregarded factors still cannot be rejected, as a more thorough empirical study is needed.

CONCLUSION

ERP is about the way of doing business (Davenport, 1998), which can be quite heterogeneous across the subsidiaries of a multinational corporation, largely influenced by the local strategy and context. Using social and economic theories, especially institutional and transaction cost theories, and the literature on standardization, convergence and transfer process, a holistic framework was developed to identify and explain the factors that influence harmonization of practices along with the global ERP implementation in multinational corporations. The empirical study and the secondary data also confirmed the presence and influence of some of these factors in the harmonization efforts.

The study suggests two main conclusions. Firstly, as suggested by other studies as well, practices differ from one another in terms of transferability. The characteristics of a practice itself and its compatibility with the subsidiaries' environment influence its potential for harmonization. This may result in a hybrid outcome characterized by a mixture of global standardization and local adaptation. The second remark is that the subsidiaries' response to a harmonization initiative enforced by a corporate headquarters may differ depending on, amongst all, their institutional context, their role in the network and the benefits associated with the harmonization. This may necessitate a differentiated approach towards the subsidiaries while pursuing harmonization across a corporation.

The harmonization framework provides the managers involved in global ERP implementations with a better overview to estimate the effort and foresee the expected challenges while harmonizing practices across a multinational corporation. For future global ERP research, it will be interesting to investigate into the relative importance of the identified factors and potential actions for mitigation of their influence. It will also be interesting to study the structural contingency factors at the subsidiary level that are influential on the adoption of a particular practice or groups of practices.

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PAPER II

Level of harmonization and ERP architecture in multinational corporations

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Level of Harmonization and ERP Architecture in Multinational Corporations

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Abstract

While one-site, one-instance implementation was the common practice during the infancy of ERP systems, the growing business trend towards globalization and the advancement of ERP and telecommunication technology have increased the popularity of centralized single-instance ERP systems among multinational corporations. The ERP distribution decision in MNCs has been mainly associated with the corporate strategy and governance structure. As global ERP deployment benefits mainly come from business consolidation, and as there are significant costs and risks associated with centralized ERP implementations, this paper investigates the influence of level of harmonization in the choice of ERP architecture in MNCs. Though the findings indicate a negative relation between the level of harmonization and a centralized ERP systems' effectiveness, the study identifies the choice of ERP architecture to be more directly affected by the factors prohibiting further divergence, namely the corporate business process governance structure and the degree of similarity of its business models.

Keywords

Enterprise Resource Planning Systems, Harmonization, Standardization, ERP Architecture, Multinational Corporations

INTRODUCTION

The need for optimal system architecture has received significant attention in the post mainframe era and the advent of the client-server systems (Davidenkoff and Werner, 2008). Though this technological advancement led to the drift of IT governance towards decentralization in the 80s, the recentralization of IT was a 90s trend (Peterson, 2001). The study by Holland and Light (1999) and Molnar (2011) point to an increasing trend in centralization of separate, country-specific applications and legacy information processing systems. In line with the centralization trend, many multinational corporations (MNCs) are in the process of re-implementing their ERP system to replace the standalone applications that share very little information, necessitate significant manual intervention to consolidate business data, and incur higher total cost of ownership due to the uncoordinated technical architecture (Zrimsek and Prior, 2003). The motivation for uniform global solutions is as well derived from the rapid changes in the communication technology (Ghosh, 2003; Phelan, 2011); the significant maturity of ERP hardware, software and databases; the advances in ERP systems supporting multiple currencies, multiple languages and automatic handling of country-specific import, export, tax and legal requirements (Bingi et al., 1999); and the increasing business trend towards globalization (Carton and Adam, 2003).

Despite the advantages and while most of the technical barriers to global deployment of centralized ERP systems have fallen, a centralized architecture is not considered appropriate for all organizations, but the ERP strategy of an MNC is suggested to fit the corporate business strategy and constraints (Rayner and Woods, 2011). The most successful ERP projects are suggested to be those that support strategic business objectives and goals (Rayner and Woods, 2011). The majority of studies on information system architecture, and more specifically ERP architecture, have an emphasis on the alignment between MNCs' information system architecture and their strategic objectives and governance structure (e.g. Clemmons and Simon, 2001; Davenport, 1998; Hawking et al., 2007; Henderson and Venkatraman 1993; Ives and Jarvenpaa, 1991; Kay, 1998; King, 1983; Madapusi and D'Souza, 2005; Markus et al., 2000; Tractinsky and Jarvenpaa, 1995; Zrimsek and Prior, 2003). There are as well few studies discussing the ERP architecture with respect to the information requirements and the interdependency among corporate business units, and the influence of external environmental factors (e.g. Clemmons and Simon, 2001; Gattiker and Goodhue, 2004).

While the importance of technical limitations and the corporate strategy and profile for the choice between centralized and decentralized ERP architectures is well-investigated, the impact of the level of harmonization of business processes and data structure on the choice of ERP architecture in MNCs have not been sufficiently addressed. In accordance with the existing literature, this paper uses the terms standardization and harmonization interchangeably to refer to the process of unifying diverse corporate processes into a global template. In other words, harmonization in an MNC is defined as the activity of establishing a limited set of solutions and balancing the requirements of the parties involved (Rosenkranz et al., 2010). Subsequently, the level of harmonization refers to the degree of commonality that is achieved between different process variants across an MNC (Remco, 2012) or the extent to which subsidiaries perform the same practices the same way.

Despite the fact that harmonization, and the consequent integration, visibility and control, are among the primary drivers of ERP consolidation efforts (e.g. Clemmons and Simon, 2001; Hufgard and Gerhardt, 2011; Seethamraju, 2009; Wyss, 2008), harmonization has been experienced difficult to achieve (e.g. Gattiker and Goodhue, 2004; Geppert and Williams, 2006; Sethi et al., 2008; Sheu et al., 2004). Considering the higher degree of difficulties and risks associated with ERP implementation in a global context caused by the magnitude of the required business change and the significance of the coordination tasks (Rayner and Woods, 2011; Rebstock and Selig, 2000), and the less satisfactory local-level implications of such projects (e.g. Carton and Adam, 2003; Gattiker and Goodhue. 2004; Molnar, 2011; Olson et al., 2005), it is interesting to see whether a centralized ERP is still justifiable in case of lower levels of harmonization. Furthermore, the recent emergence of loosely coupled systems and technologies based on service oriented architecture and web services and the advances in middleware technologies to integrate distributed ERP systems have made it even more interesting to look into the implications of tightly coupled centralized ERP systems for MNCs. Therefore, the study investigates the architecture of ERP systems in MNCs and the impact of the level of harmonization of business processes and data structure across an MNC on the choice between centralized and decentralized architectures.

The remainder of the paper is organized as follows: the theoretical framework will briefly discuss the previous studies with respect to the architectural choices for a global ERP solution, the factors decisive for the choice of ERP architecture, the advantages and disadvantage of technical and business consolidation efforts in global EPR projects, and the implications of a low level of harmonization for the potential benefits of ERP consolidation efforts. The theoretical framework is followed by the description of the research question and methodology. Next, the findings from the interviews with the key informants are presented and the paper is concluded with a discussion of implications, limitations and potential extensions of the research.

THEORETICAL FRAMEWORK

Global ERP architecture choices

MNCs are provided with several architectural choices for global ERP solutions. At one end there is the completely decentralized architecture, where the global ERP solution is distributed on several systems that work separately and independently, each have their own database, and may communicate with each other to a certain extent via individually defined interfaces. On the other end, there is the centralized architecture that consists of a single system on which all corporate applications and data are implemented on only one database. In its most extreme form a centralized system is configured as a single-instance system (also called a single-client system) opposed to those centralized systems comprising multiple clients. Though in a multi-client system the clients share the same system and hardware resources, the presence of multiple clients supports data separation and client-dependent configurations, and therefore a multi-client system provides a higher potential for incorporating variants in the same system (Davidenkoff and Werner, 2008). A decentralized architecture with shared services can be considered as a hybrid of centralized and decentralized architectures, in which shared service systems are the lead systems to which the subordinate decentralized systems are connected (Davidenkoff and Werner, 2008).

The remainder of the paper will have a greater focus on single-instance and completely decentralized ERP systems and their characteristics, and the comparison between the two as they represent the two ends of the architecture spectrum.

Global ERP Architecture Decision-Making

The previous studies discuss the IT distribution decision based on two sets of factors: business-related factors and technical system-related factors. While both influence the choice of architecture, the distribution decision is suggested to be made on business and not technical factors (Clemmons and Simon, 2001; Zrimsek and Prior, 2003). In the following, a brief description of these factors and their impact on the choice of architecture is presented.

Technical factors such as ERP-specific characteristics and infrastructural limitations are found influential on the choice of ERP architecture in MNCs. When deciding about a global ERP solution, sufficient attention should be paid to the feasibility of supporting multiple languages, time zones, add-ons, industry solutions, and country versions within a single system (Davidenkoff and Werner, 2008; Ghosh, 2003; Zrimsek and Prior, 2003). Furthermore, server sizing, storage capabilities, network requirements, and backup and systems maintenance

planning are of vital importance when deciding for a global ERP consolidation (Ghosh, 2003; Kay, 1998; Zrimsek and Prior, 2003). Yet, the significant growth in ERP hardware and software, and communication technology has diminished the influence of technical constraints on the implementation of a centralized ERP system (Ghosh, 2002; Rayner and Woods, 2011). Nevertheless, critical business-related difficulties still remain (Davenport, 1998).

In an organizational context, IT serves as an instrument for change on one hand, but on the other hand, it is largely constrained by the organizational internal and external characteristics with those it must align. Managerial intents, organizational characteristics, and external environmental characteristics are explained to influence IT decisions including IT distribution decisions (Peterson, 2001; Tractinsky and Jarvenpaa, 1995). Davenport (1998) and Markus et al. (2000) point to the need for an association between the level of autonomy at the corporate business units and the ERP architecture, the degree of freedom in ERP package selection and configuration, and the level of data and process commonality across an MNC. Looking at a highly centralized information and communication system as a tool to impose centralization and formalization across an MNC, Clemmons and Simon (2001) suggest an alignment between the consequent control and coordination mechanism and the corporate strategy and governance structure. Correspondingly Kay (1998) considers centralized ERP applications suitable for firms that operate as centralized organizations. While a headquarters-driven centralized architecture is suggested to suit better global MNCs intended for a high degree of standardization to harvest world-wide economies of scale, multi-domestic MNCs with autonomous business units are recommended to implement a decentralized architecture reflecting domestic needs in terms of business processes and data definition (Hawking et al., 2007; Ives and Jarvenpaa, 1991; Madapusi and D'Souza, 2005). Local profit and loss responsibility, coupled with reliance on local information systems departments and local technology, encourage orienting the application portfolio towards local requirements leading to non-integrated technology platforms, databases, and applications (Ives and Jarvenpaa, 1991).

The degree of interdependence among the business units in an MNC, defined as the degree to which business units exchange information or material in order to complete their tasks, is suggested to affect the choice of a global ERP solution as well. Greater interdependence among corporate business units is associated with greater benefits from a centralized ERP and a common formalized language (Clemmons and Simon, 2001). On the other hand functional variety and differentiation among corporate business units, i.e. the uniqueness of tasks, technologies, environment, goals etc., and the consequent variety in information requirements can lead to significant ERP-related costs if a single, standard system is broadly deployed (Gattiker and Goodhue, 2004). Resilience, stability, adaptability and flexibility for future changes are other aspects to consider when deciding about the system architecture (Molnar, 2011).

Besides the above mentioned internal factors, external factors including the diversity of national cultures, governmental requirements and legal issues associated with trans-border data flow, and economics of computing are other factors suggested to influence global IT and ERP distribution decisions (Clemmons and Simon, 2001; Gattiker and Goodhue, 2004; Stephens, 1999; Tractinsky and Jarvenpaa, 1995).

ERP Consolidation

In the context of enterprise systems, standardization is the process of producing an agreement on technical and business specifications to be used consistently across a corporation to ensure that processes, information, formats and systems are interconnected and interoperable (Markus et al., 2000). Hufgard and Gerhardt (2011) break down the ERP consolidation process into two steps: technical consolidation and business consolidation. Consolidation with a single vendor solution can begin with moving all the supporting ERP hardware to one physical data center, without pursuing any common data structure and business processes, to reduce costs and achieve ERP infrastructure standardization. A further reduction in cost can be achieved by adopting new server and disk storage consolidation technologies (Zrimsek and Prior, 2003). At the most extreme form of technical consolidation, a client is shifted from one system environment to another, or two or more clients are merged to create a single unit (Hufgard and Gerhardt, 2011).

While moving to a centralized ERP system brings some cost-savings by eliminating site and office space expenses, reducing support costs, scaling back hardware infrastructure, eliminating the need for interfaces from one system to another and reducing the number of system software and database software (Hufgard and Gerhardt, 2011), it has its own drawbacks. Decentralized architectures may be preferred over centralized architectures when it comes to system complexity; risk of downtime and system outage; change impact testing; upgrade planning; backup and maintenance planning; problem identification and resolution time; and server, storage, and network requirements (Ghosh, 2003; Hufgard and Gerhardt, 2011; Kay, 1998; Markus et al., 2000; Zrimsek and Prior, 2003). In addition, integration, especially technical integration, increases interdependency and necessitates higher change control, and therefore may delimit business process agility (Hanseth et al., 2001; Seethamraju, 2009). The real benefits of consolidation become apparent only after business consolidation, as a solely technical consolidation is suggested to result in a highly complex system (Hufgard and Gerhardt, 2011).

Huber et al. (2000) suggest semantical standardization as one of the most important issues when implementing ERP systems in MNCs. System templates are the solution for defining semantical standards to achieve global

standardization and ensure a common configuration and a common set of master data and processes across an MNC (Huber et al., 2000). Using a global template reduces ERP complexity by reducing variations in the overall solution. This impacts the management of the system during its entire life cycle; lowers the effort spent on analysing, applying, testing and deploying changes; facilitates upgrades; reduces data ambiguity; facilitates consolidation and corporate reporting; improves skill utilization and lowers resource head count required for application use, support and operations (Phelan, 2011). However, Phelan (2011) does not consider deployment of a global ERP template necessarily equivalent to an instance reduction strategy, as a global template can be used to ensure consistency across multiple ERP instances. Nevertheless, implementation of a global template may drive the elimination of variations in distributed ERP systems which subsequently results in redundancy of separate instances (Phelan, 2011).

Despite all the advantages mentioned above, achieving a consensus on standardization and harmonization of business processes and data structure has proved to be difficult (e.g. Gattiker and Goodhue, 2004; Geppert and Williams, 2006; Sethi et al., 2008; Sheu et al., 2004). The next section looks into the implications of a low level of harmonization on the effectiveness of a single-instance ERP system.

Level of Harmonization and ERP Architecture Effectiveness

Achieving a higher level of standardization is among the primary drivers of ERP consolidation efforts in MNCs to improve IT efficiency and enable a single source of truth (e.g. Clemmons and Simon, 2001; Hufgard and Gerhardt, 2011; Seethamraju, 2009; Wyss, 2008). Davenport et al. (2004) consider the very purpose of standardization of business processes to reduce the variability and variety of processes, terminology and definitions, information and data formats, and technology platforms and systems across business units to achieve efficiency and consistency in execution through automation and other means. However, global standardization is experienced to be affected by national differences in culture and language, government and corporate politics and regulations, management style, and labor skills (Sheu et al., 2004). In addition, standards tend to be confronted with the dilemma between universality and individuality, and efficiency and flexibility (Huber et al., 2000). There are studies arguing against the extensive use of global templates due to their negative impact on the local level flexibility (Hanseth et al., 2001). Furthermore, adapting business processes to a global template does not necessarily yield the same benefits across the business units of an MNC (Carton and Adam, 2003) and may not entirely reflect the local practices and requirements (Clemmons and Simon, 2001; Madapusi and D'Souza, 2005; Zrimsek and Prior, 2003). Deployment of a global template is also expected to be difficult in case the constituent business units are not willing to give up control (Phelan, 2011). The absence of a centralized control often results in multiple and varied ERP configurations across business units (Madapusi and D'Souza, 2005). Stressing the significant magnitude of business changes brought by simultaneous system and business consolidation, Ross et al. (2006) recommend business consolidation only after IT architecture maturity in terms of technology standardization. All these challenges may lead to lower than intended harmonization during global ERP implementations and consequently, as we will demonstrate, a reduction in the associated benefits with ERP consolidation.

Though ERP systems can be used to provide a common language between corporate business units, a misperception underlying ERP systems is that they automatically lead to discipline and process integration across organizations, while common business processes and data throughout an MNC are the necessary prerequisites for this goal (Huber et al., 2000; Sethi et al., 2008). As the level of localization of ERP systems increases there will be more difficulties in information sharing due to the inconsistent data formats and processes (Hawking et al., 2007). This will in turn influence the possibility of supporting international expansion and global operations, and the opportunity for controlling more remote subsidiaries, as control and coordination are enabled only through accurate, real-time information shared in standard format across departments, currencies, languages and national borders (Carton and Adam, 2003; Hawking et al., 2007). Accommodating diversified process and data within a single system, though possible, is costly, as each variant needs to be maintained and supported separately (Hufgard and Gerhardt, 2011). In addition, in such cases, investment in customized integration code might be required to facilitate data alignment and to obtain an integrated and holistic view of business data (Madapusi and D'Souza, 2005).

The more harmonized the business processes across the business units of an MNC, the larger the fraction of the system will consist of the common core. It is argued that a larger core, and subsequently a smaller need for local tailoring, justifies a common global application (Ives and Jarvenpaa, 1991). Similarly, Davenport (1998) and Hawking et al. (2007) consider a good example of a firm suitable for a centralized architecture as a firm which has achieved a high level of commonality of business processes. Likewise Ghosh (2002) suggests success of a global rollout approach to depend on the level of harmonization across the organization. The winners of global ERP consolidations are seen to use their applications to standardize business processes and information across their corporation (Rayner and Woods, 2011). In case of low levels of harmonization Ghosh (2002) suggests avoiding a phased roll-out, and instead going for new implementation at each corporate business unit. There can be found examples of cases that failed in their ERP consolidation effort as a result of diversified processes caused by national and cultural differences (e.g. Sheu et al., 2004). A decentralized architecture is suggested to

be more suitable for those MNCs incorporating a number of autonomous business units where data definitions and business processes reflect domestic requirements (Hawking et al. 2007).

RESEARCH FRAMEWORK

The concept of fit expresses the idea that the object of design must match its context in order to be effective (Livari 1992). Based on the contingency concept and the findings from the literature described in the previous section, Figure 1 suggests that the relation between ERP architecture and its effectiveness in terms of integration, control and coordination, and total cost of ownership is moderated by the level of harmonization, such that effectiveness will be higher at higher levels of process and data harmonization.

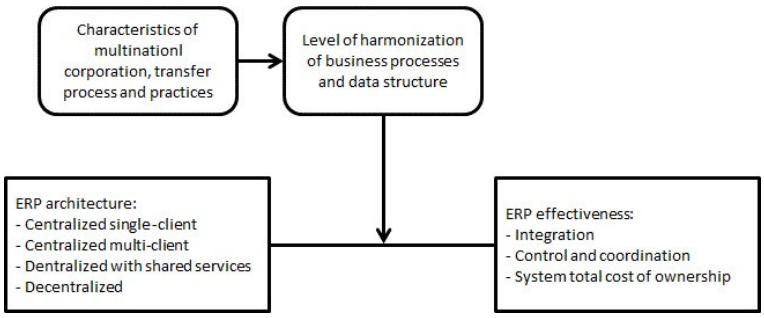

Figure 1 : Relation between ERP architecture and its effectiveness moderated by the level of harmonization

While the potential benefits of business consolidation may compensate for the drawbacks of technical tight coupling and limited local flexibility, an important question remains concerning the suitability of a centralized system in case of low levels of harmonization and the moderated associated benefits. Therefore it is interesting to see whether and how the level of achievable harmonization of business processes and data structure across an MNC should influence the choice of ERP architecture.

Though, the indirect relation between the level of harmonization and a centralized ERP effectiveness in terms of integration, control and coordination, and system total cost of ownership have been pointed out by few studies, it is not clear how much harmonization would justify a single-instance ERP system in MNCs. Failing to achieve the intended level of harmonization, it is important to study whether a single-instance ERP system with a significant number of diversified configurations is still justifiable considering the drawbacks of technical tight coupling and lower local flexibility. Therefore an empirical study was conducted to shed more light on the ERP architecture decision-making in MNCs, especially in relation to the level of harmonization of business processes and data structure across the business units.

RESEARCH METHODOLOGY

The rather exploratory nature of the study, the immaturity of theories in relation to ERP distribution decision especially with respect to the level of harmonization, and the context-dependency of such decision-makings make case study a suitable approach to enhance the construct validity and to provide a holistic understanding of the role of and the interplay between the different factors decisive for the choice of ERP architecture. As the first step and in order to study the decisive factors for the choice of architecture and especially the role of the level of harmonization in the ERP distribution decision, we have conducted a pilot study based on a series of semi-structured interviews with key informants, including three SAP consultants and an IT director, all engaged in single-instance SAP implementation in various MNCs. Among the SAP consultants, one has been working for more than seventeen years as the SAP technical architect assisting major MNCs with their SAP landscape decision-making, the second one has been involved in two global SAP implementations, and the third is experiencing his first global single-instance SAP implementation as the solution architect. The IT manager was the initiator and the architect of the global SAP program in his respective company and was responsible as the program manager.

The informants have been involved in global SAP consolidation projects that have achieved various levels of harmonization: while some ended up with a high degree of commonality across the involved business units, others were not successful in realizing a high level of harmonization despite the single-instance SAP implementation. As Eisenhardt (1989) has stated, the theoretical sampling of the polar type cases makes the process of interest transparently observable. Flyvbjerg (2006) suggests that the polarity between the cases will help to obtain information about the significance of various circumstances for case process and outcome. Accordingly, the informants' engagement in consolidation projects with various level of achieved harmonization provided us with the opportunity to question the implications of a centralized SAP system with a low level of harmonization for an MNC, in terms of both business- and system-related outcomes, and the potential influence of the level of harmonization on the decision-making. The inclusion of the IT director in the study could ensure

avoiding the potential bias coming from the loyalty of the SAP consultants to the system. It could also ensure including the business-related aspects of such decision-makings in the discussions.

The rather significant market share of SAP in comparison with other ERP vendors justifies the choice of vendor. The exclusive focus on SAP also controls for the potential variations in ERP architecture caused by ERP-specific characteristics. However, any extension of the findings to other EPR vendors' system requires a thorough study of the system and its product-specific characteristics that may influence the choice of architecture.

The interviews were tape-recorded and transcribed. The within-case and cross-case coding was performed based on the main themes and theoretical concepts. The potential bias in the interviews is expected to have been mitigated by triangulation of data sources, i.e. several interviewees and some documents, enhancing the credibility of the study.

FINDINGS

The findings from the interviews confirm the previous studies suggesting harmonization and the consequent visibility among the main drivers of SAP consolidation in MNCs. However, the informants did not consider a single-instance SAP implementation an equivalent to a harmonization effort, as a single-instance system could still accommodate various configurations to meet local requirements. It is technically possible to configure each business unit relatively separately in a single-instance system, meaning that a single-instance SAP implementation does not essentially require a global template roll-out.

> "Harmonization can be avoided even in a single system. Nowadays systems, especially SAP systems, are flexible and can be configured differently for different company codes. [Therefore] harmonization is more than a single system [implementation]."

> "Lots of specifications can be configured not only at the company code level but even at the plant level. Lots of the processes can be different in the companies."

> "It is not true [that a high level of harmonization is needed to implement a single-instance system]. You can do almost whatever you want in the ERP system."

Yet, identical configuration of system-level and client-independent features is inevitable in a single-instance system, necessitating a certain level of harmonization across the MNC. Consequently, the possibility for accommodating variants is the highest in a decentralized architecture, followed by multi-client and single-instance systems.

As a single-instance system still provides an MNC with a wide variety of options for localization, a high level of harmonization cannot be enforced through a centralized ERP implementation, but is achieved through negotiations between corporate business units. However, one informant argued that a single-instance system increases the potential for harmonization, as it highlights the local deviations and increases the chance of identifying and spreading best practices across an MNC.

While there are different opinions regarding the minimum level of harmonization to justify a single-instance system, all informants suggested a single-instance system as the starting point for any consolidation efforts, unless there were strong arguments against it. However, it appears that the distribution decision-making process is not an exact science.

> "By default, let's go for a single client and then convince me why it is not possible."

> "This kind of landscape planning is not exact science. There is a lot of history and religion involved. For the people deciding what to do and how to do it, it is mainly based on what they have tried before, what did work, what didn't work and what sounds good to them."

The business models and the IT and process governance structure of an MNC are suggested to be the most influential factors in the choice of architecture, whereas most of the technical issues with a centralized SAP system have been overcome. While network requirements, legal legislations on data storage and transfer, size of corporate business units, and corporate sell-off strategy are also mentioned influential in distribution decisions, a centralized system is suggested to be suitable only in case of the presence of a centralized IT and business governance organization and the similarity of the business models across the MNC. In other words, a decentralized MNC can still implement a centralized system as long as a centralized IT and business process governance organization is in place and compromise with respect to system configuration is achievable considering the degree of diversity of business models. While the similarity of business models across an MNC reduces the risk of incompatibility of the harmonized solution with the individual business units' requirements, the centralized IT and process governance ensures centralized decision-making with respect to system configuration and system management tasks e.g. change process, service level agreements, downtime planning, upgrades planning etc.

> "If there are similar business models and if there is centralized governance, and by the centralized governance I mean dictatorship to a certain level, then you can do a central system, otherwise you cannot. […] It's primarily IT governance but also process governance. You have to have global process owners."

> "What would have been important instead of just running the harmonization and single ERP program is to say you are not implementing anything before you have the corporate function in place that actually has the responsibility for the new business model and processes. Unless you have that you shouldn't continue. You should wait until the full governance is in place and it is anchored."

> "A single-instance system is about reaching compromise, so a global system needs the top management involvement. If they really think harmonization would destroy their business then they shouldn't do it. A single system will enforce harmonization and this will influence the autonomy, because they have to change some of the things they used to do."

> "On the business model, there will be limitations on what you can do, what processes and process variants you can support. […] There might be limitations of the functionalities that you can support in the same system simultaneously."

> "Don't go for a central system if you have many diverse businesses, otherwise I'd always try to centralize."

However, deciding about the architecture solely based on the existing business models and governance structure is not recommended, but the future evolvement is vital to be taken into account.

> "The risk is not that much about what we do today, but mostly in what we could do or like to do tomorrow."

> "A low level of harmonization may justify a multi-client system, but if the board is intended for a higher level of harmonization in the long term, then they should go for a single-client system, because a single system will enforce some level of harmonization anyway and also facilitates further harmonization."

While it might be technically possible to globally deploy a single-instance SAP even in case of a significant number of diversified configurations of business processes and data structure, implementing a single-instance system in MNCs with lower levels of harmonization runs the risk of facing conflicts at later points in time. Variants are typically the indicators of differences in the business models and/or autonomy in decision-making across an MNC. Even if the variants can be incorporated in the same system at the time of implementation, there is the likelihood of further divergence in the future, which then will cause major problems for the system management and maintenance. Moreover, the growing number of variants may eventually reach a point where it will not be possible to accommodate them all in a single system. The similarity of the business models and the presence of a centralized IT and process governance organization would mitigate the risk of further divergence.

> "[The risk is higher in case of a single system with a low level of harmonization] because they are not used to harmonize. […] All these variants come from somewhere and there is a likelihood that more variants come in future, which then may run the risk that these variants cannot be accommodated in the same system."

> "If you don't harmonize and let people build up their own way of doing business, they will come with even more requests for [local] optimization and in the long run it might not be beneficial."

The level of harmonization of business processes and data structure not only influences systems' complexity and costs along its lifecycle, but also impacts business agility at the corporate level, as a higher number of process variants will make it more difficult to dynamically modify, reconfigure and deploy business processes to accommodate potential future requirements of an MNC as a whole. Implementing a single-instance system in case of a low level of harmonization also influences system agility, as it necessitates more testing and maintenance effort to avoid unintended impacts of new and diversified configurations on the other parts of the system. Level of harmonization also affects system's user-friendliness, as the higher the number of business unit-specific options, the more difficult it will be to use the system in the daily operation.

> "The value of the template and rollout solely relies on the amount of commonality. […] The benefit of a template is that it should be easy to roll out and it should be easy to maintain. But easy to maintain depends on the ability to keep the template equal. [Otherwise] you don't get all the benefits of a central system, [especially] the low cost."

> "If you have a system with a high level of harmonization and want to change the way everyone is working, then the central system has a high agility. If you have a system with a low level of harmonization, then you can change one variant fairly quickly, that means you are agile for part of the business but no for the total business."

> "A single system with a low level of harmonization increases the test effort because you need to test more variants to make sure you have not influenced other parts unintendedly."

> "Putting all variants in a single client makes tables bigger with lots of different options for entries and this makes the system less user-friendly."

The findings also confirmed the negative impact of a low level of harmonization on the visibility and transparency and the MNC's ability to control and coordinate the business units spread all over the globe, as the reports from the corporate business units are not comparable unless identical business processes and data structure are followed. The lack of visibility and comparability in turn influences the effectiveness of management decision-makings. The negative relation between the level of harmonization and the degree of integration was as well confirmed by the informants and was discussed in relation to the ease of intercompany transactions and communications.

> "[Level of harmonization] also defines how good is your corporate reporting because it defines if the numbers are comparable."

> "Different data structure requires huge effort to convert the formats [for reporting purposes]. You will have difficulties comparing the figures, and may end up comparing apples and oranges. This can lead to wrong management decisions."

Despite the risks associated with a centralized system with a low level of harmonization and the moderated benefits, a centralized SAP still brings benefits, especially with respect to IT operational costs.

> "A central system with a low level of harmonization is a risk, that's why you shouldn't do it. But still you'll have some benefits, one of them being IT cost savings, the second one being the potential to harmonize without having to redesign the complete set-up."

> "A central system brings IT costs savings in terms of hardware and people running it. It also ensures higher security through proper disaster recovery, backup procedure, extra power units etc. Decentralization makes it more difficult to ensure the adequacy of these procedures for each single site. So you really save cost if you do it centrally."

However, the informants had different and in some cases even self-contradicting opinions when faced with the question concerning the financial feasibility of a single-instance SAP implementation in case of a low level of harmonization. While one considered cost savings from consolidated hardware and centralized IT management sufficient to justify consolidation efforts, the others were in doubt. Nevertheless, to answer this question, one informant again emphasized on the importance of the similarity of business models, the ability to reach a compromise, and the objectives behind the consolidation effort.

> "[The suitability of implementing a single system in case of low level of harmonization] depends on where [the company] wants to go. The question is more the other way around. Do they want to become harmonized? […] If the company has a centralized governance and identical business model, then it's ok to have a centralized system to save IT costs. A decentralized system in such case would not make sense. But if they don't have those two, then I don't believe they can centralize on the system level to reduce IT cost savings."

Given these statements, in case of no technical restriction for accommodating diversified requirements in the same system, implementation of a centralized system in an MNC with a low level of harmonization is recommended as long as the corporation is seeking higher efficiency and therefore is intended for more harmonization in the future, the limitations imposed by a centralized system are acknowledged, and there is a centralized governance organization in place to manage and maintain the solution.

> "If you have a 50% harmonization and you can live with the restrictions of a single instance and have the governance in place to support it, then 50% harmonization is better than no harmonization."

> "I'll be concerned if the level of harmonization is lower than 75%. You can still run a system with a harmonization lower than 75%, but it is really about management decision and business strategy. If they are not intended to harmonize and consider the decentralized structure the best model for the company then they shouldn't go for a single system."

On the other hand, if the sources of diversities lead to endless discussions while defining the scope of the global template and deciding about the system management aspects, implementation of a single-instance system may not pay off due to the significance of design and compromise costs. In such cases it might be more sensible to configure the various business units in separate clients or even in dispersed systems.

> "Of course sometime the bucket of money that you need to spend to build the template becomes too big compared to the benefits that you will get by rolling out the template both from the time and money perspective. So if you have a 30% commonality, you will end up in the template building in endless discussions of variants and what is part of the template and what is not, it might not be worth it."

> "Harmonization makes senses if there is a critical mass. Harmonization of a process with a low frequency may not pay off. It is also important to see how easy it is to harmonize."

However, while two of the SAP consultants considered a multi-client system as a potential alternative to a single-instance system in case of a low level of harmonization across corporate business units, the third consultant had a different opinion: the diversities caused by a decentralized governance structure can still lead to difficulties managing a multi-client system, as such systems still carry the limitations of a single system, and therefore need to be governed centrally.

CONCLUSION AND DISCUSSION

The practice exercised in global ERP implementation projects usually favors a single-instance ERP system due to its higher potential for IT cost savings and eventual business consolidation benefits. This study, by taking a critical view to this approach, investigated the importance of the level of harmonization of business processes and data structure across an MNC while justifying platform consolidation and process integration benefits against the side-effects of technical tight-coupling and lower local flexibility.

The interviews confirmed the findings from the previous studies suggesting the moderating effect of the level of harmonization on a single-instance ERP effectiveness in terms of the degree of integration, the level of control

and coordination, and the system's total cost of ownership. In addition to these aspects, the informants also pointed to the indirect relation between the level of harmonization and a single-instance ERP user-friendliness, system agility, and business agility at the corporate level.

Though the pilot study confirmed the negative impact of a low level of harmonization on the benefits expected from a centralized ERP system, the findings do not imply the level of harmonization to be directly decisive for ERP architecture as long as the variants can be accommodated simultaneously within a single system, and the similarity of business models and the presence of a centralized governance organization delimit further divergence of business-unit specific configurations. In other words, while the level of harmonization negatively influences the benefits of a centralized system and therefore may potentially impact the distribution decision, the choice of a centralized architecture at a higher level depends on the existence of a centralized IT and business process governance organization and the feasibility of accepting the restrictions imposed by a single system to various corporate business models. As the findings do not indicate a high level of harmonization essential for a centralized and even a single-instance ERP system, they contradict some of the previous studies favoring a decentralized architecture in case of a low level of harmonization of business processes and data structure (e.g. Gosh, 2002; Hawking et al., 2007; Madapusi and D'Souza, 2005).

Underlining the importance of the similarity of business models is in line with some previous studies suggesting highly diversified business processes and information requirements, caused by significant differences in business models or industries, as impediments to implementation of a centralized standard ERP system as one standard ERP solution may not fit all business units' requirements (e.g. Gattiker and Goodhue, 2004; Zrimsek and Prior, 2003). Consistent with the previous studies, all informants also argued that a centralized ERP system would be more difficult to implement in a decentralized MNC. However proposing a centralized organization responsible for ERP and business process management sufficient for centralized ERP deployments contradicts the prior studies suggesting an alignment between an MNC's governance and control structure and the ERP distribution decision (e.g. Clemmons and Simon, 2001). This is an interesting finding for investigation in future studies.

While the findings indicate a high potential for localization even in a single-instance ERP system, and therefore the technical feasibility of a single-instance system with various configurations, it is still not clear whether a single-instance ERP is financially justifiable in the absence of business consolidation benefits. In other words, though the informants considered a single-instance ERP system harmless even in case of a low level of harmonization as long as the centralized IT governance organization and compromise on a single system's limitations are in place, one question still remains concerning whether an effort for a single-instance ERP implementation can be justified mainly based on technical consolidation benefits. The findings from the literature study and interviews indicated contradicting opinions in this respect. This question can be answered by an investigation into the positive and negative implications of a single-instance ERP system, especially with respect to the level of harmonization, and an evaluation and comparative analysis of the significance of the identified implications.

The investigation into the ERP architecture in MNCs and its business- and system-related implications is planned to continue through few case studies in MNCs with a single-instance SAP system. The most important condition for case selection will be the level of achieved harmonization to explore the dynamics between the level of harmonization and the choice and the implications of ERP architecture. Still, ERP consolidation efforts in MNCs are affected by a variety of other factors that should be considered during the case selection and data analysis. These factors may include business-related issues, e.g. corporate control and coordination mechanisms, and integration requirements; technical constraints, e.g. geographical distribution of subsidiaries and availability of the required infrastructure; and project-related factors, e.g. project time, resource and scope constraints. In addition, as a centralized ERP, though appealing to the managers at corporate headquarters, may not fit the local business units' expectations and habits, the phenomenon needs to be studied both at headquarters and subsidiary levels to control the bias and enhance the internal validity.

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PAPER III

Succeeding in process standardization: Explaining the fit with international management strategy

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Succeeding in Process Standardization: Explaining the Fit with International Management Strategy

Abstract

Purpose — This study explores the fit between process standardization and international management strategy of multinational corporations by assessing the compatibility between process standardization and corporate structural characteristics in terms of asset configuration and headquarters–subsidiary relationships.

Design/methodology/approach — First, after a literature review on multinational corporations' strategy and process standardization, the study suggests two propositions on the fit between corporate international management strategy and process standardization. Second, to empirically examine the propositions, the study investigates the outcome of process standardization in three cases with different strategic and structural contexts. Third, using the propositions and empirical findings, the study proposes a framework for aligning process standardization with MNCs' structural characteristics.

Findings — Process standardization has a higher degree of fit in multinational corporations pursuing global integration where process standardization parallels the need for coordinating interdependencies in the functional structure, and is consistent with the headquarters' operational control over the subsidiaries. Process standardization has a lower degree of fit in multinational corporations seeking local responsiveness as process standardization disturbs the financial control relationship between the headquarters and subsidiaries and is less crucial for coordination as the subsidiaries contain the necessary coordination mechanisms.

Originality/value — The study provides in-depth understanding of how the international management strategy and consequent structural characteristics of multinational corporations affects process standardization in the course of a global ERP implementation. The study proposes conditions of fit for aligning process standardization with asset configuration and headquarters–subsidiary relationships of an MNC.

Keywords — Process standardization, Global ERP, International management strategy, Structure, Multinational corporations, Case study

Paper type — Research paper

1. Introduction

The need for optimal information technology (IT) architecture has received substantial attention in the post-mainframe era and advent of client–server systems (Davidenkoff and Werner, 2008). Although technological advancements led to the drift of IT towards decentralization in the 1980s, the trend toward IT recentralization was back a decade later (Peterson, 2001). In line with the centralization trend, the popularity of corporate-spanning global enterprise resource planning (ERP)

systems has also grown among multinational corporations (MNCs) (Phelan, 2011). The motivation for global ERP systems derives from rapid changes in communications technology; the maturity of ERP hardware, software, and databases; and the advances in ERP systems supporting multiple currencies, multiple languages, and country-specific import, export, taxation, and legal requirements (Bingi et al., 1999; Phelan, 2011). A global ERP system brings cost savings by scaling back hardware infrastructure, reducing the number of interfaces, and decreasing support costs (Hufgard and Gerhardt, 2011). More importantly, MNCs implement global ERP systems to streamline business processes and improve the flow of information across corporate subsidiaries (Carton and Adam, 2003; Gattiker and Goodhue, 2004; Hanseth et al., 2001). However, while MNCs worldwide have made substantial investments in global ERP systems, implementation has proven to be unexpectedly difficult. Many ERP implementation failures have been associated with inadequate focus on business processes (Jarrar et al., 2000).

Although integration of business processes and data serves as an important motive for the implementation of global ERP systems in MNCs, global ERP implementations do not automatically lead to integration. Common business processes and data standards are prerequisites for seamless transactions and information exchange across an MNC (Sethi et al., 2008). However, conflicts often arise between local and enterprise-wide requirements during process standardization. Many MNCs are still struggling to streamline the flow of business processes and data across their subsidiaries. A recent study by American Productivity and Quality Center (APQC, 2014) indicates unacceptable disparities among processes and data models in more than 50% of surveyed MNCs, including those with a single-instance global ERP system.

Global ERP implementation and process standardization efforts have a strong political component and are often hindered by universality–individuality and efficiency–flexibility dilemmas (Huber et al., 2000; Markus et al., 2000). To address these dilemmas, several studies highlight the necessity of fit between ERP architecture – i.e., ERP system(s) distribution – and corporate strategy for global integration and local responsiveness (e.g., Clemmons and Simon, 2001; Ives and Jarvenpaa, 1991; Karimi and Konsynski, 1991; Madapusi and D'Souza, 2005). However, as these studies' focus is primarily on ERP architecture, they only implicitly discuss process standardization by assuming that a single-instance global ERP system is inevitably configured based on common process and data standards. This assumption is also despite the fact that advances in ERP systems have made it possible to support differentiated requirements within a single system (Bingi et al., 1999). Furthermore, these studies only partially discuss the issue of causality, i.e. why a certain international management strategy necessitates a particular ERP architecture. Their emphasis is predominantly on aligning the ERP architecture with the headquarters' role and its control over subsidiaries. While the headquarters' role may specify the feasibility of deploying a global standardized ERP system as a control and coordination mechanism, it is not sufficient to address whether such integrative mechanisms are needed. The international management strategy of an MNC is not only reflected in its headquarters–subsidiary relationships but also asset configuration, which is argued to better indicate integration requirements (Gattiker and Goodhue, 2005).

Consequently, while the earlier studies emphasize the need for aligning business process reengineering efforts with business strategy (Olson et al., 2005), they do not propose sufficient guidelines for realizing the alignment. To address the gap, the current study asks and answers one

question: how does an MNC's international management strategy affect process standardization in the context of a global ERP implementation?

We answer the question in three stages. First, drawing on a literature review, we explain the impact of a particular international management strategy on an MNC's structural characteristics in terms of both headquarters–subsidiary relationships and asset configuration. We assess the compatibility between the structural characteristics and process standardization as a centralizing coordination mechanism. This analysis gives rise to two propositions that argue process standardization in the course of a global ERP implementation is a better fit and thus is likely to be more successful in MNCs structured for global integration compared to those designed for local responsiveness. Second, we empirically examine the propositions using case studies of three MNCs that have experienced process standardization in the context of a global ERP rollout but vary in their strategic focus and therefore structural context. Third, using the propositions and empirical findings, the study then presents a contingency framework and develops conditions of fit between structural elements characterizing an MNC's international management strategy and process standardization.

The remainder of the paper is organized as follows. In section 2, we use the literature to describe international management strategies in MNCs, process standardization, and the fit between the two. Section 3 presents our research methodology, followed by descriptions of the three cases and findings from within- and cross-case analyses in section 4. In section 5 we present a model to frame the fit between process standardization and MNCs' structural characteristics. Sections 6 and 7 conclude with a discussion of findings, contributions, limitations, and potential extensions of the research.

2. Theoretical Background

In this section, we first present a definition of process standardization and the challenges that MNCs face when unifying process standards across subsidiaries. Second, we briefly describe two common types of international management strategy in MNCs and their implications for corporate structure in terms of asset configuration and the headquarters–subsidiary relationship. We also assess the compatibility between process standardization and MNC structural characteristics under the two international management strategies. This analysis gives rise to two propositions.

2.1. Global ERP and Standardization

In the context of enterprise systems, standardization is the process of reaching an agreement on technical and business specifications to be used consistently across an MNC (Markus et al., 2000). Hufgard and Gerhardt (2011) break down the ERP consolidation process into two steps: technical consolidation and business consolidation. Similarly, Ross et al. (2006) distinguish between technology standardization and corporate-wide data and process standardization as two separate stages of enterprise architecture maturity. Given these studies, we differentiate process standardization from technology standardization in the course of global ERP implementations. On the one hand, technology standardization refers to standardization of ERP infrastructure by moving all supporting ERP hardware to a single physical data center, adopting new server and disk storage consolidation technologies, or merging two or more clients into a single one (Hufgard and Gerhardt, 2011; Zrimsek

and Prior, 2003). On the other hand, process standardization in an MNC is the activity of defining and agreeing on a finite and manageable set of rules and standards for conducting business processes (Fernandez and Bhat, 2010; Rosenkranz et al., 2010; Tay and Parker, 1990; Tregear, 2010). Process standardization is aimed to reduce variability in business processes across corporate subsidiaries (Tregear, 2010). Given these definitions, in this study, process standardization outcome refers to whether an organization succeeds in reducing variants in process and data standards.

Although it is possible to configure different process variants within a single system, discrepancies in configuration of a single ERP system increase system complexity and thereby its implementation and maintenance costs (Hufgard and Gerhardt, 2011). Consequently, semantic standardization is extremely important when implementing global ERP systems in MNCs (Huber et al, 2000). Reducing ERP system complexity by limiting variations in the overall solution is not the only reason for process standardization. Better integration and hand offs, comparable performance figures, greater agility when introducing changes, and redeployment of people from one subsidiary to another are additional objectives that encourage MNCs to unify process standards across subsidiaries (Davenport, 2005; Hammer, 2010; Tregear, 2010). Given the complexity and costs of global ERP implementations, some researchers even argue that only MNCs seeking process standardization can achieve a positive return on such investments (e.g., Davenport, 1998; Hufgard and Gerhardt, 2011).

Tregear (2010) argues that in a perfect world, the "one true process" would be executed exactly the same way across an organization whether it is a single site operation or spread across a country or spread across many countries. Taking a mechanistic view to business processes, i.e. a fixed sequence of well-defined activities or tasks that convert inputs into outputs in order to accomplish clear objectives (Melão and Pidd, 2000), several studies suggest that operational similarity and producing "the same output" give rise to the potential for process standardization (e.g., Harmon, 2007; Mueller, 1994; Ross et al., 2006; Tregear, 2010). However, while in theory all common processes are standardized everywhere, in practice local variations in business processes are inevitable and necessary. Emphasizing on the human aspects of business processes and viewing business processes as a set of subsystems of people, tasks, structure, and technology that interact with each other and with their environment, earlier studies on ERP implementation suggest many different reasons for why business processes are designed and executed differently in organizations. Dissimilarities in local market imperatives (Davenport, 1998; Hanseth et al., 2001), and cultural and institutional distances (Gamble, 2010; Griffith et al., 2000; Sheu et al., 2004) are often cited as important sources of conflicts. These studies support the contextual embedding view that best practice is situationally specific (Carton and Adam, 2003, Wagner and Newell, 2004).

Another alternative view looks at standardization of business processes as a structural mechanism that organizations use to achieve coordination (Mintzberg, 1993). This view can better explain the organizational conflicts that often arise when standardizing business processes in the course of a global ERP system implementation. Process standardization as a coordination mechanism provides integration; however some organizations may simply not be positioned for integration and it might be in their best interests to have a certain degree of segregation (Davenport, 1998; Chen, 2001). Gattiker and Goodhue (2005) suggest that the need for integration is influenced by the interdependence between the subsidiaries of an MNC. In addition, standardization of processes results in vertical centralization of organizations by reducing the decision-making power of lower line

managers relative to those higher up (Mintzberg, 1993). By replacing local process standards with a limited set of corporate standards, process standardization takes away subsidiaries' control over their business processes. Therefore, resistance toward the implementation of a global ERP system with a standardized configuration may simply be the death rattle of local autonomy (Hammer and Stanton, 1999). Table 1 illustrates five examples of cases where process standardization caused political struggles between headquarters and subsidiaries due to its lack of fit with the MNC's strategy or structure.

Author	Case	Objective	Problem	Outcome
Geppert and Williams (2006)	Finnish multinational corporation	Implementation of company-wide model to rationalize operations	The global model challenged local management's power and strategic choices and was perceived to be a threat to the subsidiary's expertise.	Headquarters decided to maintain original charter responsibilities of the subsidiary and its local processes.
Grant (2003)	Multinational corporation, leader in specialty metal products	Implementation of a single ERP system to support a more flexible and seamless organization with lower costs	Centralized IT architecture contradicted the decentralized business operating model.	Insufficient buy-in for global ERP at subsidiary level created significant implementation difficulties.
Hammer and Stanton (1999)	IBM	Worldwide standardization of operations to fit the customers operating on a global basis	IBM's existing management systems had concentrated power in the hands of subsidiary managers and they were reluctant to sacrifice their own ways of working.	To realize standardization, IBPM centralized accountability for business processes and allocated power to members of the corporate executive committee.
Hepsø et al. (2000)	Statoil	Global ERP implementation accompanied by business standardization	The program underestimated problems of making fairly autonomous subsidiaries accept a standardized solution. Centralized solutions challenged the identity of the subsidiaries as responsible, competent actors.	To correspond with the decentralized governance model, the strict standardization policy had to become flexible. The project objective shifted from a standardized solution to local- and subsidiary-specific solutions without tight coordination.
Markus et al. (2000)	U.K.-based multinational manufacturer of telecommunications equipment and power cables	Adoption of a single ERP package to reduce technology acquisition and implementation costs and to identify and disseminate the best operating practices across subsidiaries	Changes from past practices and the centralizing configuration of the system were perceived to be excessive by similar but autonomous subsidiaries that previously had control over technology decisions, subject only to central financial review.	The company was obliged to spend several years in consensus building before initiating package implementation.

Table 1: Examples of MNC cases where process standardization caused conflicts in headquarters-subsidiary relationships

These examples suggest that process standardization as a centralizing coordination mechanism may not be suitable for all MNCs. Assuming that structure follows strategy (Donaldson, 1987), this study argues for the necessity of alignment between process standardization and international management strategy of an MNC. The next subsection discusses process standardization in relation to this contextual factor.

2.2. International Management Strategy and Process Standardization

In separate studies, Bartlett and Ghoshal (1999) and Prahalad and Doz (1999) proposed that the essence of MNCs' international management strategy was framed by the management of two imperatives: meeting local demands and capitalizing on worldwide competitive advantages. The importance of multinational customers and competitors, investment and technology intensity, and cost reduction are among the main pressures for an international management strategy based on global integration, whereas the differences in customer needs and distribution channels, importance of local competitors, and host government demands for local self-sufficiency encourage local responsiveness in MNCs (Bartlett and Ghoshal, 1999; Prahald and Doz, 1999). An MNC's international management strategy in turn is devised along two structural dimensions: configuration of assets, and headquarters–subsidiary relationships (Bartlett and Ghoshal, 1999). While global integration strategy aims at maximizing corporate efficiency by global deployment of resources and central management of activities, local responsiveness strategy pursues context-sensitive decisions taken by self-contained subsidiaries (Bartlett and Ghoshal, 1999; Prahald and Doz, 1999, Roth and Morrison, 1990).

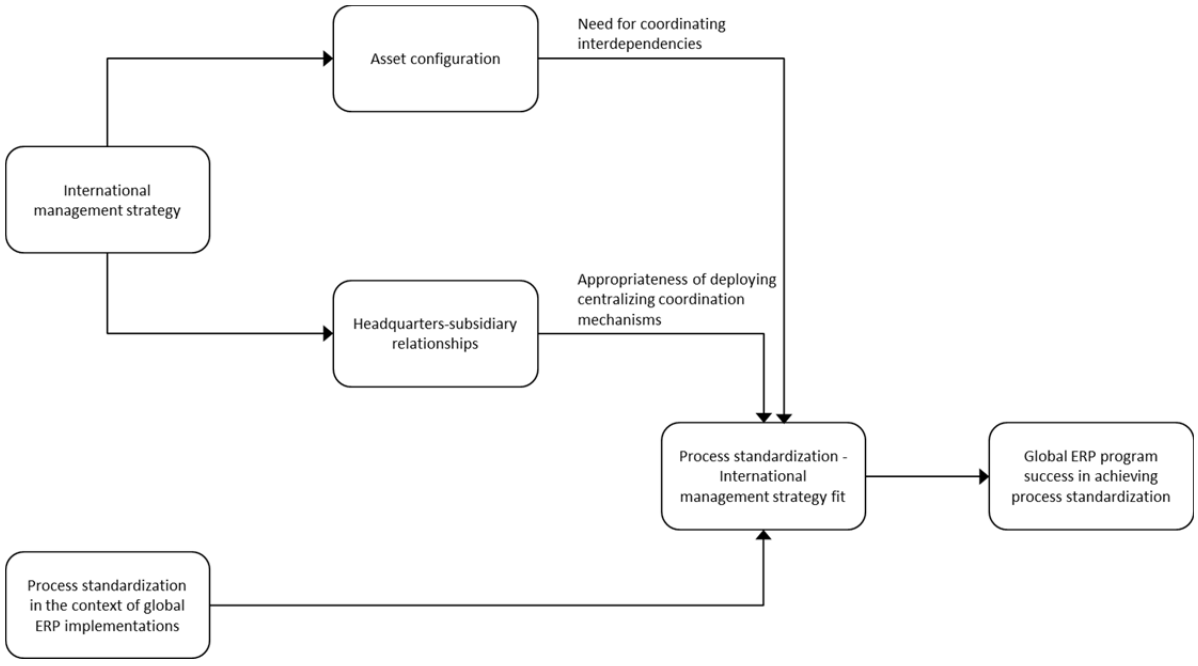

Figure 1: Fit between process standardization and international management strategy

Contingency theory proposes that superior performance comes from a good fit between strategy and environmental demands, and between organizational structure and strategy (Donaldson, 2001). Considering process standardization a structural coordination mechanism and drawing on contingency theory, we argue for the necessity of fit between process standardization in the context

of global ERP implementation and an MNC's international management strategy. MNCs with a better fit between their international management strategy and process standardization better succeed in process standardization, i.e., reducing process variants. As illustrated in Figure 1, we discuss fit by raising the issue of causality, that is, by investigating how international management strategy and consequent structural characteristics affect process standardization and lead to a certain outcome for such efforts. In the next two subsections, we explore the fit by examining the compatibility of process standardization with asset configuration and the headquarters–subsidiary relationship under the two international management strategies of global integration and local responsiveness.

2.2.1. Global Integration and Process Standardization

MNCs pursuing a global integration strategy typically configure their assets based on functional structure (i.e., grouping assets by knowledge, skill, or work function) (Bartlett and Ghoshal, 1999; Mintzberg, 1993). Functional grouping reflects an overriding concern for economies of scale at the expense of workflow interdependencies (Mintzberg, 1993); therefore specialized subsidiaries in such MNCs typically are highly interdependent (Jarillo and Martinze, 1990). Lacking built-in mechanisms for coordinating workflows, functional structures deploy process standardization, direct supervision, and action planning from higher managerial levels to manage interdependencies (Mintzberg, 1993). Therefore, in MNCs seeking global integration, headquarters–subsidiary relationships are usually based on operational control where subsidiary behavior is managed by the headquarters and where strategic and operational decisions are centrally controlled (Bartlett and Ghoshal, 1999). With centralized decision making and control, the role of the subsidiaries is to implement plans and policies developed at the headquarters (Bartlett and Ghoshal, 1999).

We argue that process standardization, as a centralizing coordination mechanism, is in line with hierarchical and bureaucratic control in MNCs pursuing global integration strategy and coordinates interdependencies across their functional structure. Indeed, integration and coordination are the prime motives for process standardization, as interdependencies trigger the need for a common formalized language (Cavusgil et al., 2004; Gattiker and Goodhue, 2004; Gupta and Govindarajan, 1991; Mintzberg, 1993). Transactions between subsidiaries involved in similar business processes are expected to be less costly in time and effort. This leads to our first proposition.

Proposition 1: Process standardization in the context of a global ERP implementation has a higher degree of fit with MNCs pursuing a global integration strategy, in which process standardization coordinates interdependencies in the functional structure and does not disturb the operational control relationship between the headquarters and subsidiaries. This is likely to have a positive impact on process standardization success during the global ERP implementation.

2.2.2. Local Responsiveness and Process Standardization

MNCs seeking local responsiveness usually configure their assets based on market-based structure to allow subsidiaries to respond to local or regional market differences (Bartlett and Ghoshal, 1999; Mintzberg, 1993). Market-based grouping sets up relatively self-contained subsidiaries, ideally comprising all the important sequential and reciprocal interdependencies (Mintzberg, 1993). Consequently, there are limited interdependencies across the subsidiaries, and subsidiaries' interdependencies to the common structure are mostly confined to drawing on resources and support services and contributing profit (Jarillo and Martinze, 1990; Mintzberg, 1993). Furthermore,

as subsidiaries in MNCs targeting local responsiveness are sensitive to market situations, they are given considerable freedom to make their own decisions and then act on them (Bartlett and Ghoshal, 1999; Mintzberg, 1993). Therefore, the headquarters–subsidiary relationship is typically overlaid with financial control in which subsidiaries—usually set up as profit centers–are responsible for their financial performance (Bartlett and Ghoshal, 1999; Mintzberg, 1993).

We argue that because local responsiveness is negatively correlated with the level of control exercised by headquarters (Martinez and Jarillo, 1991), process standardization as a centralizing coordination mechanism may not fit MNCs structured for such strategy. An imposed centralized mechanism increases the likelihood of emergent conflicts if it undermines existing levels of subsidiary autonomy (Geppert and Williams, 2006). Furthermore, with all necessary coordination mechanisms contained within the subsidiaries, MNCs seeking local responsiveness will rely less on standardization for coordination. This leads to our second proposition.

Proposition 2: Process standardization in the context of global ERP implementation has a lower degree of fit with MNCs pursuing a local responsiveness strategy, in which process standardization disturbs the financial control relationship between headquarters and subsidiaries and is less required for coordination as subsidiaries contain most of the necessary coordination mechanisms. This is likely to have a negative impact on process standardization success during the global ERP implementation.

3. Research Methodology

Our propositions assert that process standardization in the context of a global ERP implementation better fits MNCs structured for realizing global integration strategy compared to those seeking local responsiveness. To demonstrate the relevance of our propositions, we conducted case studies in three MNCs that were undertaking or had already undergone process standardization alongside a global ERP implementation. The choice of methodology can be justified with respect to the explanatory nature of this study and our attempt to explicate the mechanisms that caused a certain outcome for process standardization efforts (Easton, 2009). The case study approach also enabled us to understand process standardization within the rich context of the cases and to explore whether any other contextual factors had influenced the process standardization outcome (Johnston et al., 1999).

Adopting a theoretically determined sampling methodology (Eisenhardt, 1989), we based our case selection on the two structural elements characterizing an MNC's international management strategy, namely, asset configuration and headquarters–subsidiary relationship. As illustrated in Figure 2, the selected cases represent three different combinations of the structural elements, which provided the context necessary for clarifying our theoretical arguments. Therefore, the cases are polar-type cases selected to fill theoretical categories and to investigate the theorized differences across cases (Eisenhardt, 1989; Johnston et al., 1999). Because all three cases were headquartered in Denmark, the research design controlled for potential country-of-origin influences on the choice of coordination mechanisms imposed on subsidiaries (Gamble, 2010). In addition, all three cases adopted a single-instance, single-client ERP architecture from the same vendor, thereby eliminating potential differences in process standardization caused by technical features of the ERP system. However, the three cases varied in subsidiaries' geographical distribution, and thereby institutional

distance – that is, e.g., cultural and regulatory differences – across subsidiaries. Because the institutional distance may affect the success of practice transfer within an MNC (Kostova, 1999), during data collection we questioned the impact of culture and legislation on process standardization outcome.

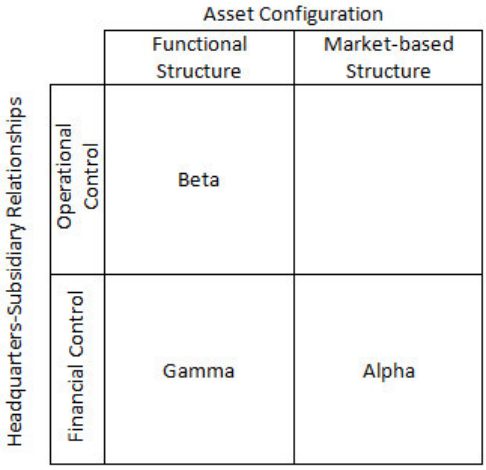

Figure 2: Structural characteristics of selected cases

We used semi-structured interviews as the primary method of data collection. To assess the propositions, we needed an understanding of the structural context of each case, the outcome of process standardization, and whether there was an association between the structural context and the success or failure of the global ERP program in realizing its goals for process standardization. While the interview questions targeted these specific topics, we aimed at gaining holistic insight into the drivers and challenges of the process standardization effort in each case. Our objective was to gain new understandings of process standardization and to identify any other potential factors that had impacted the process standardization outcome. Appendix A presents the interview guide covering the topics and key questions directing the interview under each topic.

From September 2012 through October 2015, the first author conducted interviews with the business and IT representatives of the global ERP program in the three MNCs. A total of 21 interviews were conducted, all of which were recorded and transcribed. (Note: Some of the persons were interviewed more than once.) Follow-up questions occasionally supplemented the interviews to resolve ambiguities and inconsistencies. Having interviewed both business and IT members of the global ERP programs, we expect to have compensated for potential biases in interviewees' perceptions of the process standardization effort, its outcome, and the contextual factors that led to that particular outcome (Tracy, 2010). To obtain convergent validation from various data sources, we also collected data from archival sources describing the organizational governance structure, standardization objectives, global ERP program charter and business case, and corporate process standards and principles (Tracy, 2010). Table 2 presents the case study organizations and respective interviewees' positions.

Data analysis was carried out in two stages according to the pattern-matching approach (Yin, 2009). Pattern matching can be conducted using variation on either dependent or independent variables (Campbell, 1975; Yin, 2009). As our case selection implies, for this study we chose the dependent-

variable design approach where we investigated the outcome of the process standardization effort in relation to each case's particular asset configuration and headquarters–subsidiary relationship. The first stage of data analysis aimed at assessing whether the evidence for each case was internally valid and supported our pre-specified propositions. In the second stage of data analysis, we performed an overall assessment to determine whether the data across the cases provided sufficient evidence to support the propositions. Section 4 presents a summary of the within- and cross-case analyses. When analyzing the data, we took a middle position between open and theory-determined coding (Dey, 1993). Although we applied our pre-specified theoretical propositions in analyzing the three cases, our coding of the empirical data also aimed at allowing for new insights to emerge. Appendix B provides the representative quotations from each case's data and illustrates selected first-order concepts and second-order themes generated during data analysis.

Case	Description	Interviewees
Alpha	Producer of dairy foods	Global ERP program director, chief enterprise architect, enterprise architect, IT business manager
Beta	Producer of industrial equipment	Operational excellence director in operations, IT delivery manager for operations, business process manager for operations, business process manager for sales
Gamma	Supplier of engineering solutions to process industries	Six members of global ERP business process council, global ERP program manager, CIO, CEO assistant

Table 2: Cases and interviewees

4. Empirical Study

The literature review suggests the necessity of fit between process standardization in the course of a global ERP implementation and an MNC's international management strategy. The fit is essential to ensure compatibility of process standardization with the structural mechanisms that enable various international management strategies. In this section, we present our findings from the three case studies to assess the theoretical propositions. First, we present a description of each case to illustrate how the structural characteristics of a particular international management strategy affected process standardization in the course of a global ERP implementation. Second, we draw a comparison between the three polar-type cases to demonstrate how differences in international management strategy and thus structural characteristics influenced the global ERP program achievements with respect to process standardization. Table 3 presents an overview of the three cases with respect to their structural context and the motives, challenges, and outcomes of process standardization.

4.1. Case Alpha

Alpha is a key player in the dairy industry with representation in 27 countries, most of which are European. To accommodate the differences in distribution channels and market structure in various geographical regions, Alpha grouped its assets into eight self-contained regional divisions with limited lateral linkages. Decision-making power was also considerably dispersed down the line authority chain to the regional divisions, limiting the role of headquarters to planning and controlling financial targets, allocating resources, and managing shared support services. In 2001, after a major merger, Alpha decided to consolidate the standalone ERP systems across the regional divisions by corporate-wide implementation of a single-instance, single-client ERP system. However, IT managers soon realized that ERP technical consolidation alone would not contribute value unless the

underlying business processes were aligned. This was the start of an IT-commenced program that aimed at unifying Alpha into "one company" along with the global ERP rollout. The almost identical product portfolios and thus operational similarity of the regional divisions made process standardization appear to be a plausible goal (Mueller, 1994; Ross et al., 2006; Tregear, 2010).

Concept	Alpha	Beta	Gamma
Asset configuration	Self-contained regional divisions predominantly located in Europe	Specialized business units for sales and production, distributed across Europe, America, and Asia	Interdependent business units for transfer of technology and delivery of turnkey projects, distributed across Europe, America, and Asia
Headquarters–subsidiary relationship	Headquarters had financial control over business units, responsible for planning and controlling financial targets	Headquarters had operational control over business units, directing strategic and operational decisions.	Previously the headquarters had only financial control over the business units, but it gained operational control after a recent reorganization.
Driver of process standardization	Corporate IT	Senior business managers in business process management teams	Corporate IT
Business motives for process standardization	—Enable agile reorganization and seamless integration within regional divisions —Optimize central allocation of resources based on comparable financial figures —Enable central management of activities	—Improve business performance by corporate-wide adoption of best practices —Enable central management of dispersed resources —Formalize collaborations across specialized business units	—Formalize collaborations across interdependent business units —Enable central management of dispersed activities
Process standardization challenges	The global ERP program did not possess the mandate to define, enforce, and maintain common process standards across the autonomous regional divisions.	The global ERP program had to convince the business units of the need for process standardization, but also had the mandate to enforce the common process standards.	The global ERP program did not possess the mandate to define the common process standards and had difficulties creating consensus across autonomous business units.
Process standardization outcome	Global ERP rollout was highly localized. Process standardization was more successful in corporate-owned business processes. Process standards further diverged after program termination.	Global ERP program succeeded in rolling out a strictly standardized global template, most importantly in core business processes. Localization was allowed in cases of critical customer requirements and legislation.	Global ERP rollout was highly localized in the first few pilot implementations. Process standardization gained momentum after corporation centralized the corporate governance model.

Table 3: Comparative overview of cases

In addition to enabling a more cost-efficient IT architecture, Alpha aimed at deploying the integrative nature of process standardization to pursue three business objectives. The first was enhancing corporate agility for reorganization. In Alpha, IT systems and their embedded business processes had

always been an obstacle for recurring organizational changes. The self-contained divisions encompassed an extensive network of sequential and reciprocal interdependencies. Despite optimal alignment within each division, business processes were not aligned across the divisions. As the regional divisions were frequently reconfigured, Alpha deemed common process and data standards essential for maintaining seamless integration within the divisions. The second objective sought by process standardization was optimizing headquarters decisions on resource allocation. Only highly unified process standards could ensure comparable financial figures and performance reports from the regional divisions and thereby optimal resource allocation. As for the third objective, process standardization was a means to enable central management of a range of activities such as procurement. The absence of product diversification across the regional divisions served as the motive to centralize decision making (Mintzberg, 1993).

However, Alpha's corporate IT faced great difficulties in defining and imposing the common process standards. The regional divisions in charge of their own strategic and operational decisions resisted process standardization as they perceived it as a threat to their autonomy and accountability for maximizing financial performance. Neither the global ERP program nor the headquarters possessed the mandate to enforce the process standards.

> *[Process standardization does not fit] because we are organized based on geographical national market. Because each market is allowed to work as they wish. Because each of them has their separate target provided that they comply with the target.*
>
> *[The divisions argued] if we are going to optimize our earnings, we have to be able to decide how to do things ourselves.*
>
> *Headquarters was not the police, had not control over the divisions. Divisions are huge. Headquarters could not force standardization.*

Therefore, while by year-end 2005 Alpha was running on a single-instance ERP system, process standardization was by no means close to what the program had envisioned. The program was more successful in standardizing processes in corporate support services such as finance and human resource management. Although the program managed to facilitate financial reporting, through e.g., unification of chart of accounts and fiscal year, the figures were still not comparable due to the absence of common standards in all other related business processes. After termination of the global ERP program, lack of central governance for managing the process standards led to further divergence of standards to accommodate a higher level of flexibility in regional divisions. In the absence of strong process ownership, the old organizational structure reasserted itself (Hammer and Stanton, 1999).

> *The degree of localization is very much higher than we aimed for. We did not succeed in the program. Back to the original targets of the program no we did not actually succeed.*
>
> *When the program office was closed and when the management team in the company had changed and the business thought there is no one guarding this anymore, and there is no one shouting at us if we do not do the changes, then we begin to do things as we used to. It is creeping.*

What would have been important instead of just running the program after the business model was defined was to say you are not implementing anything before we have corporate function in place where is actually the responsibility of this business model and processes. And they should have the necessary power to do that. Unless you have that you shouldn't continue. We should have waited until the full governance was in place and be sure that it was anchored.

Alpha represents a typical example of an MNC following an international management strategy based on local responsiveness. This strategy is projected in the distributed configuration of assets and decision-making authority across the regional divisions (Bartlett and Ghoshal, 1999). Process standardization in Alpha did not mainly have the objective of improving communication and coordination across the regional divisions, but had predominantly targeted coordination within the regional divisions. This contradicted the divisions' autonomy for coordinating their activities and eventually resulted in Alpha's failure to enforce and maintain the process standards. To summarize, in the presence of an international management strategy based on local responsiveness and decentralized asset configuration and decision-making authority, global ERP implementation in Alpha did not achieve its process standardization targets. Therefore, Alpha illustrates our second proposition and suggests a lower degree of fit between process standardization in the context of a global ERP and MNCs structured for local responsiveness.

4.2. Case Beta

Beta is a leading industrial equipment manufacturer, represented by its 80 business units in 55 countries in Europe, Asia, and America. Beta had a functional structure in which the business units were specialized as sales offices, production plants, and distribution centers. To coordinate interdependencies across business units, the headquarters not only had the responsibility for planning and controlling financial targets, but also had authority over how the corporation operated. In 1995, Beta started a journey toward business excellence after the new CEO questioned Beta's efficiency and competitiveness. The new strategy encouraged a higher level of concentration of physical assets and decision-making power. Emphasizing corporate efficiency rather than local performance, Beta gradually moved responsibility for profitability to the headquarters and increased its authority for directing business units' strategic and operational decisions. Later, as a part of efficiency and integration strategy, Beta launched a program to consolidate ERP systems across its business units by rolling out a single-instance, single-client ERP system with a standardized configuration.

In addition to reducing ERP operation costs, the global ERP rollout was an opportunity to reengineer business processes and improve corporate performance by adoption of industry best practices. Therefore, the global ERP program in Beta primarily targeted core value-adding business processes for standardization. Furthermore, Beta exploited process standardization to facilitate coordination across corporate business units in two ways. First, common process standards could facilitate central and integrated planning of dispersed resources and activities, and thus could improve operational efficiency in for instance production planning, inventory control, and material handling. Second, standardization could formalize routine transactions across the business units that were characterized by relatively limited value chain activities and significant interdependencies. Therefore,

process standardization was greatly encouraged by resource interdependencies across the corporation.

In Beta, process standardization was a relatively smooth process. The corporate functions owned the business processes and comprised business process management teams responsible for the design, control, and improvement of business processes across the corporation. The same teams assumed responsibility for unifying and aligning process standards in the context of global ERP implementation. While the process standardization effort faced some resistance from the business units, the central business process management teams had the mandate to enforce the new standards. As they were not held accountable for local profitability, business units indeed had little cause to resist process standardization.

> *I think that is related to some kind of mandate from headquarters [to business process management organization]. It is a little bit both the carrot and stick that we prefer to use the carrot that companies can see the common benefits in these [process standardization] but in some cases we need some management decisions from headquarters that say now you need to do this.*
>
> *The companies' responsibility for P&L [profit and loss] has also been one of the challenges because of course they have looked at the local P&L. So but that was also changed so most companies now they do not have their own P&L. The local P&L should not be an argument against standardization.*

Consequently, the program achieved a high level of process standardization and allowed for localization only where the legal institutional context and customers' critical requirements demanded differentiated process standards.

> *We are pushing out standardization more and more now because we can see that if we really want to have economies of scale then in some cases we need to say yeah the way we do calculation of our productivity we don't want to argue about that. This is how we do it.*
>
> *When you talk about localization, it might be due to local regulations. Another thing could be customer behavior. These are social accepted. But apart from these business units must convince us that their way of working is better than the others. And if that is the case we will adopt their proposals and put it into the best practice and remove the other one.*
>
> *To get efficiency we saw the need to have some group functions in order to manage that because how we could have standardization if everything had to be discussed with all companies.*

The relatively concentrated asset configuration and centralized decision making were the two important structural mechanisms that enabled Beta's strategy for global efficiency and integration (Bartlett and Ghoshal, 1999). Indeed, process standardization was a means to enhance the headquarters' ability to centrally plan and integrate activities across specialized and occasionally dispersed assets. This strong role empowered the headquarters to define and impose the process standards on corporate business units that had always been directed by the headquarters. In short, in the presence of an international management strategy based on global integration and centralized

asset configuration and decision-making authority, global ERP implementation in Beta succeeded in achieving its process standardization targets. Therefore, Beta illustrates our first proposition that suggests a higher degree of fit between process standardization in the context of a global ERP implementation and MNCs that pursue an international management strategy based on global integration.

4.3. Case Gamma

Gamma, a leading supplier of engineering solutions to process industry, comprises a group of gradually acquired engineering companies operating in more than 40 countries in Europe, America, and Asia. The business units in Gamma were divided into technology centers and market companies. The role of market companies was mostly limited to sales and services in various local markets. The technology centers, which specialized in different but related technologies, not only directly served the market but also assisted the market companies to serve local markets whenever the market companies lacked necessary technological competencies. Therefore, the business units were highly interdependent for technology transfer and delivery of joint projects that comprised a wide range of technologies. The business units had enjoyed a high level of autonomy for strategic and operational decisions, and only had been subject to financial control by headquarters. In 2012, Gamma launched an initiative to consolidate the ERP systems across its business units along with unification of financial structure to facilitate reporting. However, strongly believing that a solely technical consolidation could not be financially justified, the IT managers aimed at enabling business consolidation benefits by pursuing a higher level of process standardization along with the global ERP implementation. This turned the global ERP implementation into a business process management program that sought business outcomes to avoid disappointments generated by advanced technology deployments (Davenport, 1993).

While process standardization was essential for reducing the complexity of the global ERP implementation and operation, process standardization in Gamma was aimed at another important objective: efficient coordination of interdependencies across affiliated business units. Although the asset configuration did not represent a pure functional form, the corporate strategy for design and execution of turnkey projects had led to tight lateral interdependencies that were primarily managed by mutual adjustment among interdependent business units (Mintzberg, 1993). Lacking efficient mechanisms to coordinate interdependencies among the business units, the global ERP program aimed at exploiting process standardization to improve collaboration across the corporation. The IT managers could also foresee a day when common process standards would enable integrated planning of dispersed resources and activities such as procurement and inventory management. Therefore resource interdependencies were an important motive for process standardization.

However, in the early stages of the program, corporate IT encountered major challenges for defining the template of common process standards. To define the process standards, the global ERP program established a governance board comprised of business representatives from motivated and mature business units. However, the governance board did not possess formal authority to make decisions about corporate standards and was even reluctant to do so, anticipating the potentially negative impact of process standardization on business units' performance. This imposed a major burden that

hindered the process of building the global template and led to highly localized ERP implementations in the first few pilot rollouts.

> *We had people with ideas but we did not have anybody to make standardization decisions, nobody with defined empowerment to make decisions. And that is the prerequisite somebody with the overall responsibility.*
>
> *When I started the program the first day I thought when you go to the headquarters there would be more running the show but that is not the case. It is a decentralized company so it is not easy to come with IT and say now we go to the business and we pick guys from the decentralized organization and we put in centralized governance structure.*
>
> *You come to a powerful [local] managing director and he refuses to accept what has been done in the template and decided by the governance board and this guy is the guy earning all the money in that company, then he decides.*

Later, a major reorganization facilitated process standardization. To transform Gamma into "one company," headquarters undertook an initiative to concentrate the dispersed decision-making authority and distributed assets. Indeed, the global ERP rollout was a prelude for this transformation. The newly established corporate functions were given the responsibility to manage interdependencies across even more interdependent business units and therefore they were held accountable for the management of business processes. Subsequently, the business representatives in the global ERP program board were replaced with individuals from central corporate functions who had the formal authority for defining corporate standards. This accelerated efforts for deciding and building the global template.

> *Regarding governance if we take service there is this box called service management support and they have process development and data structure so in that box there is the background for having governance for having somebody here who makes the decisions. Now the responsibility for standardization decisions and enforcing principles is clear.*

The organizational structure in Gamma was previously suboptimal as there was a mismatch between asset configuration and the nature of the headquarters–subsidiary relationship (Bartlett and Ghoshal, 1999). The highly decentralized governance model where the headquarters only acted as the financial controller lacked the hierarchical authority to manage interdependencies across business units. Therefore, while process standardization could facilitate managing lateral interdependencies, Gamma faced difficulties defining corporate process standards as it contradicted the business units' autonomy for coordinating their own activities. Process standardization gained momentum only after Gamma started the transformation toward a more centralized governance model. Therefore, while Gamma's previous state illustrates our second proposition and a lower degree of fit between process standardization and the financial headquarters–subsidiary relationship, process standardization better fits the new centralized governance model in support of our first proposition.

4.4. Cross-case Analysis

Analyzed separately, each case supported testing the sufficient condition in which we assessed the outcome of process standardization efforts in the presence of a particular international management strategy reflected in asset configuration and the headquarters–subsidiary relationship (Hak and Dul, 2009). As the cases represent polar-type cases, each case can be used to test the necessary condition (i.e., assessing the outcome of process standardization effort in the absence of a particular international management strategy) (Hak and Dul, 2009). Process standardization in the course of global ERP implementation was less successful in cases Alpha and formerly in Gamma where neither of them was structured to support an international management strategy seeking global integration. Alpha represented the typical example of an MNC pursuing a local responsiveness strategy. Despite the interdependencies between business units, Gamma had adopted a highly decentralized governance model to ensure business unit responsiveness to its particular technology segment. Process standardization was more successful in Beta where centralized asset configuration and decision-making authority clearly indicated the corporate strategy for global integration. Figure 3 illustrates the outcome of process standardization in each case with respect to its structural context.

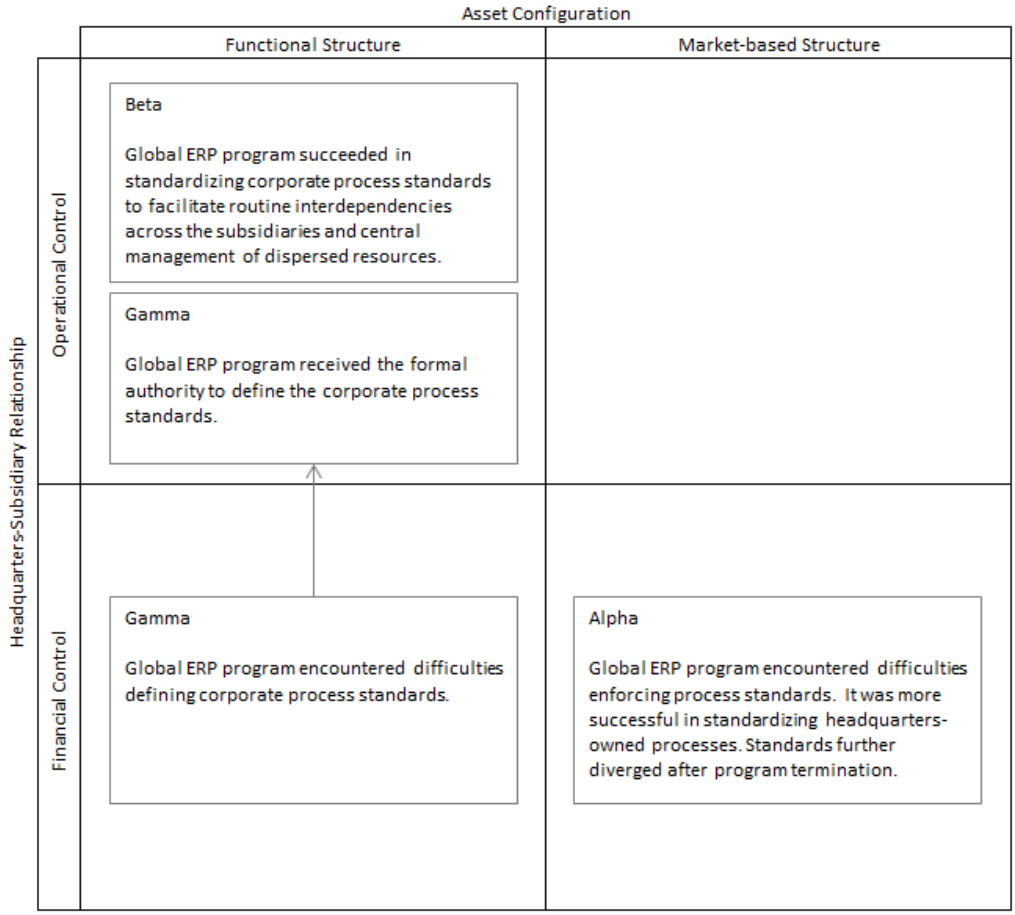

Figure 3: Process standardization outcomes in relation to structural characteristics of the cases

An organization's structures and processes typically reflect its institutional contexts (Muller, 1994). Previous studies suggest the success of convergence and transfer of practices within an MNC to be negatively correlated with the institutional distance across the corporate subsidiaries (Kostova, 1999). The multiplicity of institutional contexts across corporate subsidiaries increases the likelihood

of misfit between a globally standardized process and subsidiaries regulatory, cognitive, and normative institutions and thus difficulties in transferring the business process across the MNC (Kostova, 1999). Therefore, institutional distance could be an alternative argument for explaining the process standardization outcome in the three cases. In all three cases, the differences in local culture and legislation increased the number of process standard variants. However, interestingly the institutional distance cannot account for the greater success of process standardization in Beta where the business units are distributed across a wider geographical area, compared to Alpha where the divisions are predominantly located within Europe. Therefore, the empirical findings suggest that the structural context enforced by the international management strategy was more influential in process standardization compared to institutional forces imposed by the local environment.

The institutional and resource dependency theories can explain the dominance of structural context over local environment for process standardization in MNCs seeking global integration. Institutional duality suggests that an MNC's subsidiaries are under simultaneous pressures for consistency with the local environment and at the same time with affiliated subsidiaries (Kostova and Roth, 2002). The dominant pressure is usually the one for which the subsidiary has greater resource dependency (Westney, 2010). Underlying this premise is the assumption that resource exchange between organizations generates isomorphic pulls on the dependent organization to reduce transaction costs and to gain the legitimacy required for accessing resources (Westney, 2010). Therefore, one can expect greater potential for process standardization in MNCs that are structured for global integration regardless of institutional distance. This is because subsidiaries in such MNCs perceive being more consistent with the business processes that internally have been institutionalized essential to achieve legitimacy for accessing resources.

5. Framework

The findings suggest that international management strategy and consequent structural characteristics influence process standardization in the context of a global ERP implementation. Building on this finding, this section presents a framework that discusses conditions of fit between process standardization and structural elements characterizing the international management strategy of an MNC. In Figure 4, rows represent the headquarters–subsidiary relationship, namely whether the headquarters has only financial control over the subsidiaries or also direct their strategic and operational decisions. The columns indicate asset configuration and whether subsidiaries are self-contained or have lateral linkages with affiliated subsidiaries because of their limited value chain activities. For each combination of the asset configuration and headquarter–subsidiary relationship, we explain the outcome of process standardization in the context of a global ERP implementation.

Process standardization as a centralizing coordination mechanism better fits MNCs structured for global integration; consequently, global ERP programs in such MNCs are more likely to succeed in unifying process standards across subsidiaries. In MNCs pursuing global integration, the need for worldwide coordination encourages adoption of common processes across subsidiaries (Cavusgil et al., 2004). Process standardization not only formalizes the routine interdependencies across specialized subsidiaries (Davenport, 2005), but also facilitates central management and action planning of dispersed resources and distributed activities (Carton and Adam, 2003). In such MNCs,

the headquarters' role and its authority for managing interdependencies allows for defining and imposing common business processes as coordination mechanisms.

In MNCs where the role of the headquarters is limited to financial controller despite interdependencies across subsidiaries, process standardization during a global ERP implementation may not succeed as the headquarters is not authorized to manage interdependencies or make decisions about coordination mechanisms. According to Bartlett and Ghoshal's (1999) classification of MNC structure, in such MNCs there is, indeed, a mismatch between the asset configuration and the headquarters' role. Such MNCs will better succeed when deploying process standardization for coordination if they intend to centralize the corporate governance model, at least in those areas that require global integration.

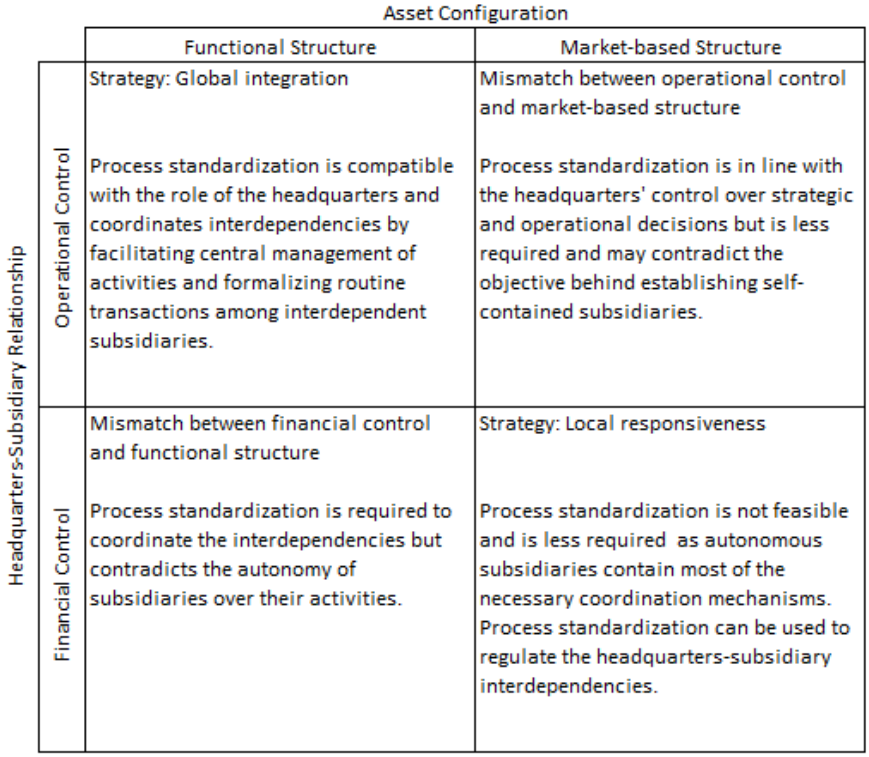

Figure 4: Fit between MNCs' structural characteristics and process standardization

Process standardization is less appropriate in MNCs structured for local responsiveness; therefore global ERP programs in such MNCs have a lower probability of succeeding in process standardization. The market-based structure diminishes the need for deploying process standardization for coordination, and the limited financial control over the subsidiaries, which allows for building local presence, contradicts the centralizing nature of process standardization. Process standardization in such MNCs may damage competitiveness especially when local differences are rooted in unique commercial propositions (van Leijen, 2005). Therefore, in such MNCs, the scope of process standardization may be limited to regulating the headquarters–subsidiary interdependencies, especially for financial reporting, resource allocation, and corporate support services.

In MNCs where the subsidiaries are self-contained but the headquarters has operational control over the subsidiaries, there is again a mismatch between asset configuration and headquarters–subsidiary

relationship (Bartlett and Ghoshal, 1999). In such MNCs, although the headquarters may have the authority to decide about the common process standards during the global ERP implementation, process standardization may not be required due to limited lateral interdependencies among the subsidiaries and may even challenge the objective behind establishing self-contained subsidiaries that independently serve local markets. Process standardization better fits those areas where the MNC deliberately intends to concentrate assets or decision-making authority.

6. Discussion

Harmon (2007) suggests that if an MNC is doing the same activity in many different locations, it should consider doing them in the same way. While asserting operational similarity as a driver for process standardization, we argue that process standardization is a centralizing coordination mechanism and therefore its deployment in an MNC also needs to be in line with corporate strategic and structural contexts. This study suggests that while an MNC's asset configuration indicates whether process standardization is essential for coordinating the interdependencies across an MNC, the nature of headquarters–subsidiary relationships determines whether process standardization disturbs the balance of power between the headquarters and subsidiaries. Therefore, aligning the decision for process standardization with the corporate asset configuration and headquarters–subsidiary relationships may resolve the conflicts caused by efficiency–flexibility and universality–individuality dilemmas. While these findings assist the managers to consciously decide about process standardization based on their corporate structural context, the study as well has two theoretical implications that pave the way for future research.

First, our findings suggest that process standardization in the course of a global ERP implementation not only increases the level of centralization in an MNC (Mintzberg, 1993), but also that achieving common process standards requires central governance to be in place, especially for managing and designing business processes. Mintzberg (1993) suggests that when an organization relies on systems of standardization for coordination, some power passes out from line managers to the designers of those systems. Alpha and Gamma were missing such designers of process standards at the corporate level as they relied on performance systems to control the subsidiaries. This issue was not present in Beta where the business process management teams at the corporate level formally had responsibility for the design, control, and improvement of business processes across corporate subsidiaries. Process standardization in Gamma received momentum only after responsibility for management of business processes was assigned to the newly established corporate functions.

Therefore, while acknowledging the positive impact of business process management for successful implementation of ERP systems (e.g., Žabjek et al., 2009), we argue that central governance for managing business processes is essential for developing and imposing common process standards when rolling out a global ERP system. Furthermore, corporate-level process ownership needs to be a permanent role to maintain the process standards and prohibit their divergence, and to ensure that adjustments occur in line with business evolution (Hammer and Stanton, 1999). Although some studies suggest the CIO as catalyst for business process management (e.g., Doebeli et al., 2011; Hammer, 2004), our empirical findings indicate that corporate IT functions cannot drive process standardization initiatives as they typically do not own the business processes.

Second, our findings suggest that the international management strategy of an MNC affects process standardization, but not necessarily ERP system distribution. As a single-instance ERP system typically employs a single logical database for the entire corporation, a number of previous studies assume that a global ERP system inevitably must be configured based on rigid rules and standards (e.g., Clemmons and Simon, 2001; Madapusi and D'Souza, 2005; Markus et al., 2000; Morton and Hu, 2008). Building on this assumption, these studies suggest that ERP distribution decisions should be made in alignment with international management strategy and the need for control and coordination in MNCs (e.g., Clemmons and Simon, 2001; Madapusi and D'Souza, 2005).

However, as illustrated by case Alpha and discussed in other studies (e.g., Hufgard and Gerhardt, 2011), a single-instance, single-client ERP system may be configured to accommodate differentiated requirements in each subsidiary. Incorporating multiple clients within a single-instance ERP system will further enhance data separation and client-dependent configurations (Davidenkoff and Werner, 2008). A recent study by the American Productivity and Quality Center shows that 17% of the surveyed MNCs have implemented single-instance ERP systems that are configured based on different processes and data models (APQC, 2014). This may suggest that global ERP implementation in MNCs is an inherent part of efforts to centralize control of computing resources in the quest for IT system economies. Centralization of IT systems in search of IT economies of scale is also in line with the view that proposes MNCs may selectively centralize or decentralize assets and decision-making authority to meet the dual requirements of global integration and local responsiveness (Bartlett and Ghoshal, 1999; Rugman and Verbeke, 1992). However, while the empirical findings do not support a direct relationship between ERP system distribution and an MNC's international management strategy, a higher level of commonality in business processes better justifies the choice of a single-instance ERP architecture (Davenport, 1998; Ives and Jarvenpaa, 1991; Rayner and Woods, 2011).

7. Conclusion

A growing body of academic and practitioner literature has researched ERP implementations, but there are only few studies that explore global ERP implementations in MNCs. There are even fewer studies that investigate process standardization as one of the main drivers of a global ERP implementation. In this study we examined the fit between MNCs' international management strategy and process standardization. Drawing on findings from a literature review and three case studies, this study explains how an MNC's international management strategy and consequent structural characteristics affect process standardization in the context of a global ERP implementation. Our findings propose that process standardization better fits the functional structure and operational control found in MNCs pursuing global integration, whereas it is less required and disturbs the financial control in MNCs seeking local responsiveness. While the findings propose the necessity of fit between international management strategy and process standardization, the study does not identify the necessity of such fit for ERP system distribution across an MNC. Our empirical findings further suggest that central governance for management of business processes is vital for defining, enforcing, and maintaining corporate process standards.

While our study provides valuable insights into the implications of international management strategy for process standardization in MNCs, there are certain limitations. First, our study takes the MNC as the unit of analysis and assesses the overall outcome of process standardization in relation

to corporate international management strategy. In that sense, our propositions are grounded on the assumption that MNC strategy can be classified into global integration and local responsiveness. However, MNCs may adopt different strategies and structures for various business domains and even subsidiaries to simultaneously achieve global integration and local responsiveness (Bartlett and Ghoshal, 1999; Rugman and Verbeke, 1992). This may necessitate a differentiated approach for process standardization across the MNC. We argue that the same propositions can guide decision making for process standardization at lower organizational levels; however, further research conducted at the business domain and subsidiary levels is needed to evaluate this assertion.

Second, in this study we investigate the outcome of process standardization by assessing its compatibility with MNCs' strategic and structural context. However, process standardization outcome in MNCs may also be affected by other factors such as the quality of the relationship between the headquarters and subsidiaries, the subsidiaries' motivation and capacity for absorbing knowledge from outside, and power resources and politics of managers within the subsidiaries. As these structures and mechanisms may influence each other's effect, the decision for process standardization needs to be in line with the sum of these structures. This encourages further studies that develop a more holistic view of factors influencing MNC structure and their impact on process standardization.

Third, while the study assumes that a better fit between international management strategy and process standardization leads to a greater level of process standardization, the fit and the consequent great level of process standardization also potentially improve the MNC's performance. However, the latter was not addressed in the current study. Further studies are required to assess the implications of process standardization for MNCs' performance. Fourth, our empirical findings suggest that fit is not necessary between ERP system distribution and the MNC's international management strategy. This conclusion in turn calls for further studies for evaluating costs and benefits of implementing a single-instance ERP system in MNCs seeking local responsiveness. As MNCs structured for local responsiveness are not expected to reach a high level of process standardization, it would be interesting to assess whether a single-instance ERP system can be justified in the absence of business consolidation benefits.

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Appendix A: Interview Guide

Topic	Question
Definition	• How do you define process standardization?
Structural context	• How is the corporate organizational structure? How many subsidiaries are there and how are they distributed across the globe? • Are the subsidiaries operationally similar? • How resources are distributed across the subsidiaries? Are the subsidiaries self-contained or only comprise a limited set of value-chain activities? • How interdependent are the subsidiaries in your corporation? • How the power is distributed between the headquarters and subsidiaries? What is the role of the headquarters? What are the accountabilities of the subsidiaries? What necessitated such corporate governance model? • Are the corporate subsidiaries comparable in terms of their decision-making power and autonomy?
Drivers behind process standardization	• What did initiate the global ERP implementation in your corporation? • Why did you decide for process standardization along with the global ERP implementation? What were the main drivers behind this initiative? What were the problems that process standardization was supposed to resolve? • How process standardization did support the corporate business strategy? • In which areas process standardization was less/more important? Why?
Outcomes of process standardization	• Do you perceive the process standardization effort in your corporation successful? Did you manage to achieve the goals for process standardization? • In which areas did you achieve more success with process standardization? In which were you less successful in realizing the common process standards? Why? • What have been the benefits and drawbacks of process standardization?
Challenges of process standardization	• What were the main challenges you faced when defining and imposing common process standards? • What were the arguments against process standardization? • Did you face the same challenges imposing process standards in all subsidiaries? How the corporate subsidiaries differed with respect to accepting common process standards? What made them different? • How the cultural and legal differences across the subsidiaries influenced process standardization?
Process standardization and structural context	• Do you think process standardization fitted the corporate governance model? Why? • How process standardization did influence the corporate governance model and the role of the headquarters and subsidiaries? • Did you find process standardization more fruitful in some process areas/subsidiaries compared to the rest? What characterized these process area/subsidiaries?
Process governance	• Who defined the common process standards? • How did you manage common process standards after the global ERP program termination?
Global ERP	• How the level of process standardization did influence the global ERP architecture? Could you still implement a single-instance, single-client ERP?
Learnings	• What would you have done differently, if you had the chance to redo/restart the process standardization effort?

Appendix B: Quotations from Cases - Alpha

Theme	First-order concept	Representative Quotation
Process standardization and global ERP systems	Process standardization not essential for a global ERP implementation	"You cannot force anything [standardization or a specific way of working] by moving it to one central singe system. You have to start from the other end. You have to convince the business that the standardization is a good idea all through the business for all the processes and you have to have someone centrally govern this. But you cannot use the ERP system for doing that, not possible. In ERP system you can do whatever you wanted to do."
	Process standardization to justify global ERP implementation	"When you are trying to create a new system that does not solve any problem really, but the underlying problem is the business processes. If the business processes are not aligned and do not work together, you cannot solve anything with implementing a new ERP system. What you would do is in fact spending a lot of money and getting nothing out of that and getting a lot of disappointment. So instead of just implementing a new system we looked at the planning of the business model of the company instead."
Drivers of process standardization	Process standardization to optimize central resource allocation	"So you have to do a very careful planning of how you allocate the milk to the products that you want to produce and sell to the customers. And the problem as we saw was that these eight divisions they were deeply interdependent on the same raw milk but process-wise they were not aligned and that make the process of allocating and optimizing the allocation very difficult."
	Process standardization to enable seamless integration during reorganizations	"The processes they are building [in divisions] is more or less build to support single stovepipes or single divisions and this means that IT is built to support these processes. It works within the division because everything is aligned towards the division and how they have decided to do things. But the problem is of course is that you are stuck to the organization." "Even a small change in the organization caused some very expensive and difficult changes in IT and was at that time preventing the processes and work flows to develop as fast and smooth."
	Process standardization to enable central management of activities	"This is what we aimed to do. If you look at the organizational chart, you see the stovepipes [divisions] are smaller, the cross-functional organization is a lot more visible [that is what we wanted]. We said the cross-functional organization should not only decide the financial targets but also decides how you are going to do this throughout."
Challenges of process standardization	Limited control of the headquarters over the subsidiaries was the reason for diversified processes	"And this diversification [in business processes] is what happens when the only guideline you get [from the headquarters] is the financial target and is said ok get this financial target and it is up to you how to achieve it. You do it the way that you think is the best way of doing it and that means that you build silos and stovepipes."
	Process standardization contradicted the subsidiaries autonomy and their responsibility for their profitability	"[The divisions argued] if we are going to optimize our earnings, we have to be able to decide how to do things ourselves." "The divisions argued we don't want to standardize, no we don't want to change the way we do things, we want to make our own decisions. [By having process standardization] they could not make decisions at least at the processes. Standardization means change at least for someone, even everybody. If they change they fell they lose control, they lose money, they lose control on their own way of doing things, control of the business processes." "[Process standardization does not fit] because we are organized based on geographical national market. Because each market is allowed to work as they wish. Because each of them has their separate target provided that they comply with the target."
	The headquarters role did not allow enforcing process standardization	"Headquarters was not the police, had not control over the divisions. Divisions are huge. Headquarters could not force standardization."

Appendix B: Quotations from Cases – Alpha (Continued)

Theme	First-order concept	Representative Quotation
Outcome of process standardization	Process standardization did not realize the envisioned targets	"The degree of localization is very much higher than we aimed for. We did not succeed in the program. Back to the original targets of the program no we did not actually succeed."
	Process standardization more successful in process areas managed at the corporate level	"What are moved to the corporate functions are close to being standardized, but things that still belong to single divisions are less standardized."
	Divergence is growing due to lack of central governance for management of business processes and demand for local flexibility	"There are lots of strong [local] people that they want back their own personal flexibility but they are not thinking of the flexibility of the company so I think the company is moving back to the left again, to more diversity." "When the program office was closed and when the management team in the company had changed and the business thought there is no one guarding this anymore, and there is no one shouting at us if we do not do the changes, then we begin to do things as we used to. It is creeping."
	Business growth despite lack of process standardization	"Maybe all this standardization thing is crap. Maybe I have misunderstood everything, but the company is succeeding, the company is growing, it is doubled in three years' time, so it is growing very fast. The company survives and all other companies in the world producing the same thing are having the same problem but they could have optimized better on that and get a higher margin."
Factors essential for process standardization	Process standardization requires headquarters control over subsidiaries' operations	"The control of the business processes and business model should be a corporate function. So are they interfering into the daily processes in the business divisions, yes, in a way they are because they are telling them how to do it, not just what to achieve but how to do it."
	Process standardization requires change in the role of the headquarters and subsidiaries	"Of course there is [loss in local performance because of process standardization]. But you have to think the way that maybe it is a little bad for the single business units but for the company as a whole there are more or less eliminating each other, because when you do process standardization you move responsibility to the top of the business, so that also means that you are moving decision and power to the top of the business and that means again that you remove some of the responsibilities from the single business units and take it at the corporate level instead."
	No process standardization before establishing corporate function managing the business processes	"What would have been important instead of just running the program after the business model was defined was to say you are not implementing anything before we have corporate function in place where is actually the responsibility of this business model and processes. And they should have the necessary power to do that. Unless you have that you shouldn't continue. We should have waited until the full governance was in place and be sure that it was anchored."

Appendix B: Quotations from Cases - Beta

Theme	First-order concept	Representative Quotation
Process standardization and global ERP systems	Global ERP for business and not technical consolidation	"One of the reasons we put in SAP was to align processes. So it is about process alignment it was not about putting in SAP."
Drivers of process standardization	Process standardization based on best practices to improve corporate efficiency	"The new CEO questioned our competitiveness. So he said we better have three ways of working: closing the whole lot, moving the whole lot to Eastern countries or low cost countries, or finding new ways of working. So this finding new way of working was the key part of it." "There was 10 years ago within operations the CEO had a meeting with all operational managers and there he stated that in some ways across our factories we do things too differently and It means that we are not efficient enough. He had a slide that showed our different entities and then how they were doing things differently and they wanted us to be aligned to be more efficient."
	Process standardization to support central management of business processes	"You could say it is easier to manage and govern the processes that they are more alike because performance measures, the indicators they are rooted in the same way of working whereby you could say they are some more aligned measures picked on the same platform and so forth. You could say it eases the governance of these processes and also the management in each individual company." "But in general we believe if we can standardize it is easier to share these best practices between the different companies it is easier to make improvements. If we have different processes then it is difficult to be efficient in improving these processes and it is more difficult to implement the improvement."
	Process standardization to support central management of dispersed activities	"There were discussions about how we can standardize our businesses even further that could be in relation to getting supplies into our company, in relation to how we could plan and be better off to forecast and run our businesses that was more visible in terms of demands, stock development and way of working." "If you standardize often it also comes with it is easier to have once decision body centrally making decisions across entities which have the same processes and that is also what we are seeing in this company." "Having shared service centers has become a part of our daily life and one of the key reasons being able to do so is standardization."
	Process standardization enabled resource deployment across corporation	"Despite being a small company you can get a big advantage of still being fully aligned because the business will run that much easier. Let's say you are a very small company where you have only one planer, if that planer is ill and the process is standardized then another planer from another company can take that role."
	Process standardization to optimize inter-company transactions	"We can see that different setups between different companies sometimes it gives confusion signals between the companies it means that if one supplying company is doing things differently from buying company does then sometimes it causes inefficiencies because buying company does not know the signals what it means from the supplying company. It can also if different rules are followed if one company believes that we do it like this you can only buy it this way and this is not aligned with the buying company then maybe they have to carry higher burden of inventory or longer lead times or stuff like that." "We could also see that internally between our companies it was difficult to operate efficiently because people were operating in different ways and sometimes these local processes were contradicting with what people were doing in other parts of the organization so it means that we were not able to agree on the setup between our companies so one company would order parts form another company in a way which would not be cost efficient for the corporation."

Appendix B: Quotations from Cases – Beta (Continued)

Theme	First-order concept	Representative Quotation
Challenges of process standardization	Subsidiaries resisted process standardization but central business process management teams gained the mandate to enforce process standardization	"When it becomes close to [business units] daily operations then there can be lots of discussions around whether the best practice method was better than their local method. And in some cases it causes some discussions and some resistance besides the usual resistance of having to do something new. So it was very much convincing them standardization will be a benefit for them as well and then standardization objective on a higher corporate level. There is still an element that we have to convince local companies that it is a good idea if they standardize. It has also developed over the years. Our [business process management team] mandate [for process standardization] has grown stronger and stronger." "I think that is related to some kind of mandate from headquarters. It is a little bit both the carrot and stick that we prefer to use the carrot that companies can see the common benefits in these but in some cases we need some management decisions from headquarters that say now you need to do this."
	Responsibility for local profitability was an argument against process standardization but it was moved to the corporate level	"The companies' responsibility for P&L [profit and loss] has also been one of the challenges because of course they have looked at the local P&L. So but that was also changed so most companies now they do not have their own P&L. The local P&L should not be an argument against standardization." "I think that is the case where sometimes when you try to standardize in a big organization there could be processes where standardization is not always seen as the benefit for single units and that is the balance we are always trying to strike that we should only standardize where it makes benefits for corporation as a whole and sometimes it means that single units they will see disadvantage but if you could justify it by a bigger benefit to the corporation as a whole then we do standardization. But if we cannot justify that it will benefit the corporation as a whole then we will not require the local units to follow the standardized process."
Outcome of process standardization	Process standardization as much as possible unless it contradict local regulations or customer requirements	"But we intended to move to as much standardization as possible because it will serve the business you can say and in some cases you can say it will impact the customer part in these cases we will move the other way around making sure we are fulfilling the customer request." "When you talk about localization, it might be due to local regulations. Another thing could be customer behavior. These are social accepted. But apart from these business units must convince us that their way of working is better than the others. And if that is the case we will adopt their proposals and put it into the best practice and remove the other one."
	Process standardization enforced further by the headquarters	"We are pushing out standardization more and more now because we can see that if we really want to have economies of scale then in some cases we need to say "yeah the way we do calculation of our productivity we don't want to argue about that. This is how we do it."
Factors essential for process standardization	Centralization essential to enable process standardization	"You could argue to get efficiency we saw the need to have some group functions in order to manage that because how we could have standardization if everything had to be discussed with all companies." "At the early stages of strategy group management and operations management they were pinpointing people who were supposed to centrally take the ownership of the processes so they appointed corporate process managers and process consultants who were supposed to develop and improve processes."

Appendix B: Quotations from Cases - Gamma

Theme	First-order concept	Representative Quotation
Process standardization and global ERP systems	Process standardization to justify global ERP implementation	"[Rolling out ERP with no standardization] is not enough to justify in my world spending between 20 and 60 million euro that is not enough. So from that point of view I could just make a rollout with SAP but we have no value whatsoever. So let's focus on what is really important. That is to ask the business what are the benefits that you can see in case we get a chance to standardize our processes."
Drivers of process standardization	Process standardization to facilitate inter-company transactions	"Twenty percent of business units are asking for standardization, ask us to standardize as soon as possible because they have a pain for example when they want to do joint projects. That is typically countries where they have huge projects running with different intern competences or technologies. Another point where I can put my finger is a problem is when I look at the engineering [shared service center] in India where they work for different technology centers at the same time, they clearly have a problem when they want to combine two or three drawings or two or three process methodologies into one delivery. So they quite often say just standardize so we can get on with what we are doing." "Direct waste is assumed by the business to be close to 5 to 10 percent of the total joint project. That is a lot. So from that point of view that is justification enough for me to look into common processes."
	Process standardization to facilitate central management of activities	"Standardization will also help with better organization of the activities considering the overlapping areas, such as procurement and inventory management." "Standardization concept is very welcomed in the corporate, since at the moment and in some case the companies are operating too independently and in many areas, there are no definite rules. This may reduce the potential benefits that could have been achieved." "The higher visibility over the local companies will lead to more decisions taken at the corporate level rather than local level. These decisions will be mainly regarding inter-company relationship and the approach towards the customers."
Challenges of process standardization	Defining common process standards challenged by lack of central governance	"We had people with ideas but we did not have anybody to make standardization decisions, nobody with defined empowerment to make decisions. And that is the prerequisite somebody with the overall responsibility."
	Process standardization contradicted the subsidiaries' autonomy	"Business units used to make all the decisions. Now somebody else comes and tells them what to do and they have never tried that before." "You come to a powerful [local] managing director and he refuses to accept what has been done in the template and decided by the governance board and this guy is the guy earning all the money in that company, then he decides." "I would say that for some individual companies the drawback would be that they fear or actually in reality get less decision power by themselves. I mean all those aspects of a daily life in a company there will be areas there that that decision power is not as local as it used to be."
	Process standardization contradicted the headquarters role limited to financial control	"When I started the program the first day I thought when you go to the headquarters there would be more running the show but that is not the case. Of course the headquarters is doing a lot of controlling and managing the business but I don't feel that they are really governing it as such. It is a decentralized company so it is not easy to come with IT and say now we go to the business and we pick guys from the decentralized organization and we put in centralized governance structure."

Appendix B: Quotations from Cases – Gamma (Continued)

Theme	First-order concept	Representative Quotation
Outcome of process standardization	Process standards not defined and decided	"We had much localization in the first two rollouts. The template is not fixed and there are many corporate principles and standards to be defined and decided."
	Central governance of business processes will facilitate process standardization	"They are only now designing the organization I assume regarding governance if we take service there is this box called service management support and they have process development and data structure so in that box there is the background for having governance for having somebody here who makes the decisions. Now the responsibility for standardization decisions and enforcing principles is clear."
Factors essential for process standardization	Interdependencies decisive for process standardization	"When business units collaborate with the others it makes sense to standardize but if a company is completely on their own probably it makes no sense to standardize except for the financial reporting. So you need to look into interactions, if there are sales and operation interactions with others it makes sense to standardize, if it is a closed environment where they make only money and report to the headquarters then you should only focus on reporting aspects."
	Central governance for management of business processes essential for process standardization	"Standardization will not work if organization does not have centralized governance. It will be a very bumpy road. I don't think standardization itself changes the governance structure because it is the other way around you first need to define who makes decisions then you can define the level of standardization and do the standardization. In theory it should be governance first and standardization afterwards." "In order to standardize practices among the significant number of companies in the segment, some decisions are required to come from the top. Sometimes standardization means to impose things, leading to a heavier and centralized structure. Distributing the standardized solution may require acting as a centralized company to impose the solution."
	Process standardization requires change in the role of the headquarters and subsidiaries	"Having standardization in place, the emphasis should shift from the local companies' EBIT to the corporate level EBIT, since following the common approach may contradict with the local interests."

PAPER IV

Business process management and IT management: The missing integration

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Business process management and IT management: The missing integration

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ABSTRACT

The importance of business processes and the centrality of IT to contemporary organizations' performance calls for a specific focus on business process management and IT management. Despite the wide scope of business process management covering both business and IT domains, and the profound impact of IT on process innovations, the association between business process management and IT management is under-explored. Drawing on a literature analysis of the capabilities of business process and IT governance frameworks and findings from a case study, we propose the need for horizontal integration between the two management functions to enable strategic and operational business—IT alignment. We further argue that the role of IT in an organization influences the direction of integration between the two functions and thus the choice of integration mechanisms. Using case study findings, we propose that IT as a business enabler respectively calls for sequential and reciprocal integrations at strategic and operational planning levels. Drawing on logical reasoning, we suggest that IT as a strategic driver necessitates reciprocal integration at both levels.

1. Introduction

Information technology (IT) offers a wide range of opportunities to organizations for automating, informing, and transforming their business. Promoted by the increasing centrality of IT to business performance, a rich body of literature has centered on management practices that affect the quality and range of IT's impacts. Among these practices, IT governance (ITG) aims at enabling effective use of IT by coordinating IT decision making across business and IT communities (De Haes & Van Grembergen, 2009; Peterson, 2004). While such governance mechanisms only facilitate coordination between business and IT decisions, a different element – business processes – ties the business and IT worlds together (Harmon, 2010). Business processes link business strategy to an organization's IT capabilities. Davenport (1993) acknowledges that process enforcement technologies hold the potential to provide the so-called "missing-middle" to overcome the business—IT divide. The importance of business processes in contemporary organizations has also given rise to business process management (BPM) as a management technique that ensures continuous optimization of an organization's business processes. Indeed, given the growing pervasiveness of IT-enabled business processes, BPM and IT management studies have been tightly integrated.

Numerous studies have recognized the interdependencies between IT systems and business processes (e.g., Smith & Fingar, 2003; Tarafdar & Gordon, 2007). On the one hand, IT implementations are one of the driving forces for business process reengineering in organizations (Irani, 2002). In addition to avoiding costs incurred by system customization, IT-driven approach toward BPM enables business process innovation in line with industry best practices and emerging IT trends (Smith & Fingar, 2003). On the other hand, comprehensive business process designs that reflect business requirements can be transformed into technical specifications to inform system selection, configuration, and integration (Lee, Siau, & Hong, 2003; Rosemann, 2010). In this way, process-driven IT management ensures alignment of IT decisions with business objectives. Because of these interdependencies, several studies have emphasized the need for IT roles involvement in BPM activities on the one hand, and process roles inclusion in IT decision making on the other (e.g., Doebeli, Fisher, Gapp, & Sanzogni, 2011; Hammer, 2004; Spanyi, 2010; Tarafdar & Gordon, 2007; Scheer & Brabänder, 2010; Weill & Ross, 2004).

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Table 1
Business process governance capabilities (De Bruin, 2009; Kirchmer, 2011; Santana, Alves, Santos, & Felix, 2011).

Governance capabilities	Description	Example
Structure	Organizational structure for people involved in BPM activities and the scope of their tasks	BPM sponsor Head of BPM BPM steering committee BPM center of excellence Business process experts Process owner
Processes	Formalization and institutionalization of process-related decision making at various organizational levels and within and across business processes and process improvement projects, along with broader decision making about strategic direction and development of BPM	Process improvement planning Strategy and process capability linkage Process design Process implementation and execution Process control and measurement

Table 2
IT governance capabilities (De Haes & Van Grembergen, 2009; Peterson, 2004; Weill & Ross, 2004).

Governance capabilities	Description	Example
Structure	Organizational structure for people involved in IT management activities and their decision-making rights	IT strategy committee at board level IT steering committee IT project committee Architecture steering committee CIO on executive committee IT relationship managers IT security steering committee Center of competence and excellence
Processes	Formalization and institutionalization of IT decision making and IT monitoring procedures	Strategic information system planning IT chargeback system IT portfolio management IT performance measurement IT budget control and reporting IT benefits management

However collaboration between BPM and IT management functions is not reflected in their governance frameworks. ITG frameworks are built around active involvement of business parties in IT decision making (e.g., De Haes & Van Grembergen, 2009; Peterson, 2004), but they overlook the role of BPM functions in making and monitoring IT decisions. This disconnect is also true for business process governance (BPG) frameworks. Although IT often influences and is influenced by business processes, BPG frameworks fail to specify the involvement of IT roles in BPM decision making. Failure to include process roles in IT decision making may lead to strategic misfits between business and IT (Smith & Fingar, 2003), loss of competitive advantages (Lee et al., 2003), and "technology fixation" (Scott, 1999). Disregarding IT roles in BPM decision making results in complex IT architecture (Fonstad & Robertson, 2006), and higher risk, complexity, and financial costs of IT implementations (Beatty & Williams, 2006).

In this study, we examine the integration of BPM and IT management functions and particularly how BPG and ITG, as two distinct governance frameworks, support the collaboration between the two management functions. Drawing on horizontal job specialization between BPM and IT management functions, complexity of their work, and great business process and IT system interdependencies, we expect close coordination and mutual adjustment between BPM and IT management functions. Therefore, we anticipate the need for alignment and interoperability of BPG and ITG frameworks. We examine these premises by asking and answering two questions: *Why* and *how* do BPM and IT management functions collaborate? We answer the first question by building linkages between the BPG and ITG literature to identify the shared responsibilities between BPM and IT management functions. We then empirically investigate such joint responsibilities and the governance mechanisms that enable integration via a case study of a multinational corporation with relatively mature BPG and ITG structures and decision-making processes.

The remainder of the paper is organized as follows: In Section 2 we describe BPG and ITG based on a literature review, and in Section 3 our research methodology. Section 4 discusses our findings for the overlapping accountabilities within the BPG and ITG frameworks. Drawing on the case study, Section 5 provides evidence of the mechanisms that enable integration between BPM and IT management functions. In Section 6 we present a model to frame integration of the two functions. Sections 7 and 8 conclude with a discussion of findings, contributions, limitations, and potential extension of the research.

2. Theoretical background: defining BPG and ITG

Governance, which is the organization of management, comprises the set of goals, principles, organizational charts, policies, and rules that define or constrain what managers can do (Harmon, 2008). This section briefly describes BPG and ITG as the overarching guidelines for management of business processes and IT assets.

2.1. Business process governance

BPM is a structured management approach that uses methods, policies, metrics, management practices, and software tools to coordinate all aspects of the specification, design, implementation, operation, measurement, analysis, and optimization of business processes (Davis & Brabänder, 2007). As one of the six core elements critical to building BPM maturity (Rosemann & Vom Brocke, 2010), BPG is accountable for managing the BPM process (Kirchmer, 2011).

BPG refers to the establishment of relevant and transparent accountability and decision-making processes to guide desirable process actions (De Bruin, 2009; Doebeli et al., 2011; Scheer & Brabänder, 2010). Table 1 provides an overview of the two principal governed BPG capabilities, that is, capabilities that prescribe the essential activities to be performed within the BPM discipline.

The structure and processes within a BPG framework ensure setting, monitoring, and directing of BPM strategy, overseeing and aligning all BPM-related activities and projects, designing and driving implementation of business processes, providing required resources and IT systems, inspecting and auditing process execution and performance, and initiating process improvements (Burlton, 2010; Hammer, 2001; Kirchmer, 2011).

2.2. IT governance

ITG is the framework for the distribution of decision-making rights among stakeholders and the procedures and mechanisms for making and monitoring IT decisions (Peterson, 2004). The purpose of ITG is to encourage desirable behavior in the use of IT (Weill & Ross, 2004) and to ensure that an organization's IT sustains and extends the organization's strategies (ITGI, 2003). Table 2 presents the structure and decision-making and monitoring processes that constitute ITG.

The ITG structural and process mechanisms ensure defining and directing of IT strategy and principles, determining business priorities in IT investments, managing IT-related risks and security issues, managing IT performance measurement, and monitoring delivery of business benefits during and after implementation of IT investments (De Haes & Van Grembergen, 2009; Weill & Ross, 2004).

3. Research methodology

We conducted this study in three stages as depicted in Fig. 1. This section briefly presents the research methodology in each stage.

First, to understand the accountabilities and decision domains in BPM and IT management and to identify their integration points, we investigated BPG and ITG studies identified through a structured literature search in Web of Science and Scopus. As illustrated in Table 3, while ITG has been heavily examined for almost two decades, BPG has received significantly less attention from academia, despite the substantial number of studies on BPM. However, additional papers on BPG were identified in the Handbook on Business Process Management (Vom Brocke & Rosemann, 2010), and more papers on BPG and ITG were included by citation trailing the literature found during the structured search. We then carefully analyzed the selected papers with respect to BPG and ITG decision domains and accountabilities. Our comparative analysis revealed an overlap in the accountabilities specified within the two governance frameworks with respect to business—IT alignment and IT-enabled business value realization. This potentially answers the question of why BPM and IT management functions collaborate. Result of this analysis is presented in Section 4.

Second, for purposes of examining and validating findings from the literature analysis and to understand how BPM and IT management functions collaborate, we conducted a single in-depth case study. The choice of methodology can be justified given the exploratory nature of the study, our focus on organizational aspects of BPM and IT management, and our objective of understanding relationship between BPM and IT management functions in conjunction with their context (Benbasat, Goldstein, & Mead, 1987; Corbin & Strauss, 2008; Orlikowski, 1992; Yin, 2009). The organization selected is a multinational corporation with both BPG and ITG frameworks in place. The corporation has been actively managing its business processes for more than 15 years, relying on well-developed BPG decision-making processes and structure. We were also aware that corporate-wide ITG had been formalized over the previous seven years to enable deployment of a unified IT solution across corporate business units. Therefore, the selected organization is an information-chosen case.

We consider the case to be archetypical, exemplifying corporations with centralized, mature, and distinct BPG and ITG arrangements, where IT plays a reactive role and has negligible influence on business strategy. We expect both BPG and ITG characteristics to influence integration between BPM and IT management functions. Researchers generally agree on the influence of organizational structure and competitive strategy on approach toward ITG adoption whereas no significant association is found between ITG design and an organization's industry type and size (Brown & Grant, 2005). The studies by Henderson and Venkatraman (1993) and Teo and King (1997) also highlight the impact of IT role on direction of integration between business and IT. We did not identify any situational studies on BPG, but Melenovsky (2006) suggests BPM maturity influential on organizations approach toward BPG structuring and staffing. This is also in line with our experience researching BPM. In less mature cases we have usually found BPM function embedded within IT organization and only responsible for requirements engineering during IT projects, whereas in more mature cases a distinct BPM function typically has the accountability for managing business processes along their lifecycle.

Having both BPG and ITG in place, the selected organization is an appropriate case for studying potential collaborations between BPM and IT management functions and the associations between their governance frameworks. We may as well consider the case to be critical because if the findings from this single case illustrate collaboration between BPM and IT management functions, then the study will indicate the necessity of integration between BPG and ITG frameworks.

We used interviews as the primary method for gathering data. At the start, we structured the interview guide in an explorative manner to provide the interviewees with opportunities to elaborate on corporate BPM and IT management, but as we discovered more on the nature of linkages between BPM and IT management functions, the interview questions became more focused. In line with our research question, we investigated corporate BPG and ITG structures and decision-making processes, probed any collaboration between BPM and IT management functions, and explored structural and process integration mechanisms that facilitated the collaboration. Our agenda did not include relational integration mechanisms. Between September 2012 and November 2013, the first author conducted nine interviews with corporate process and IT representatives including the process owner, process manager, business relations manager, delivery area manager for operations, business relations manager for sales, and the two corporate BPM framework drivers. (*Note*: two persons were interviewed twice.) The duration of each interview varied from one to two hours. Follow-up questions supplemented the interviews occasionally to resolve ambiguities and inconsistencies. Interviewing members of both BPM and IT management functions, we expect to have compensated for potential biases in interviewees' perception toward the role of their function in business–IT collaborations (e.g., Tracy, 2010). To obtain convergent validation from various data sources, we also collected data from archival sources describing BPG structure and ITG decision-making framework, and narratives and some interview transcripts from the second author's earlier longitudinal study of the corporation.

We then carried out the data analysis in three stages. First by aggregating interview transcripts and archival sources, we developed a set of narratives that described governance of BPM and IT management in the corporation. These narratives also included

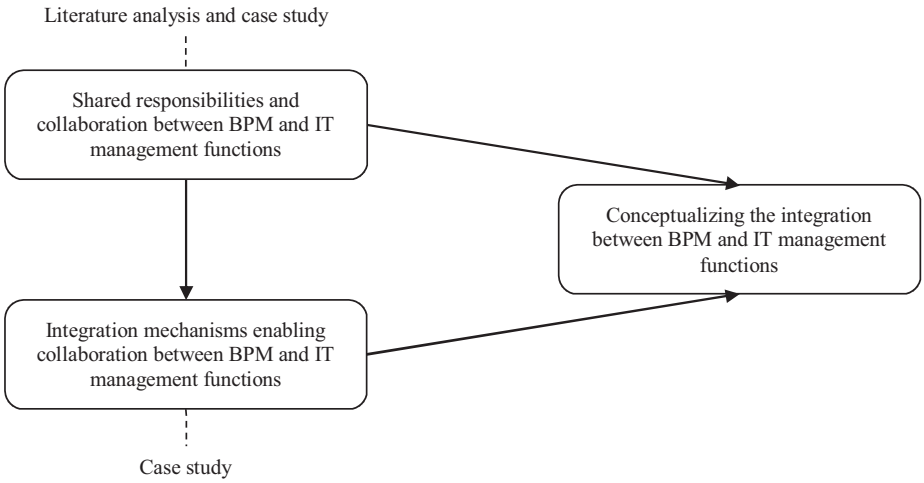


Fig. 1. Methodology and contribution of paper.

Table 3
Number of papers on BPG and ITG topics found during structured literature search.

Topic	Keywords	Scopus	Web of science	Refined selection based on title and abstract
BPG	Business process governance; process governance; governance of business processes; governance of processes; business process management governance; governance of business process management; BPG; BPM governance	52	22	13
ITG	Information technology governance; IT governance; information systems governance; IS governance	224	126	40

details about collaborations between BPM and IT management functions. To enhance confidence in findings, we shared and discussed the narratives with two of the interviewees: one from BPM function and one from IT management function. A summary of these narratives is presented in Section 5. Second, coding and analyzing the case data and inspired by previous studies on business–IT alignment, we identified two properties that characterized integration between corporate BPM and IT management functions: planning level of integration and direction of integration. Third, facing variations in direction of integration at different planning levels, we further analyzed the case data to identify the contextual factors that caused the difference. Inspired by previous studies on business—IT alignment (e.g., Henderson & Venkatraman, 1993; Teo & King, 1997; Weiss, Thorogood, & Clark, 2006), we found the role of IT influential on integration direction between the two functions. The detailed description of these concepts is presented in subsection 5.4. We selected the three concepts of planning level of integration, direction of integration, and role of IT to develop a model that explained integration between BPM and IT management functions. Results of this analysis appear in Section 6.

4. Literature analysis: why do BPM and IT management functions collaborate?

We consider BPG and ITG subset disciplines of corporate governance. An organization's critical dependencies on IT suggest that ITG must be an integral part of corporate governance and a primary concern of the board of directors (Van Grembergen, De Haes, & Guldentops, 2004; Weill & Ross, 2004). Encompassing the same factors as the more traditional corporate and IT governance, BPG is also a subset of corporate governance with a focus on intangible process assets (Doebeli et al., 2011; Hammer & Stanton, 1999; Markus & Jacobson, 2010). In addition, we consider BPG and ITG to be distinct governance frameworks. While IT is an important enabler for process redesign, BPM is a holistic approach to the management of process change with customer and employee issues as important as IT issues (Harmon, 2010; Masli, Richardson, Sanchez, & Smith, 2011). Meanwhile, important interdependencies between business processes and IT systems suggest the need for interoperability between the two governance frameworks.

Our comparative analysis of BPG and ITG literature revealed overlap in the responsibilities specified within the two frameworks. BPM and IT management functions share responsibility for business—IT alignment and IT-enabled business value realization. Building on this finding, we suggest the need for integration between the two functions to collaboratively accomplish the shared responsibilities. The next two subsections elaborate on our arguments for overlapping accountabilities. Each subsection aggregates and contrasts the studies on BPG and ITG with respect to that specific responsibility to depict overlap in the accountabilities of BPM and IT management functions.

4.1. Business—IT alignment

Business—IT alignment is the process of achieving competitive advantage by developing and sustaining a symbiotic relationship between business and IT (De Haes & Van Grembergen, 2009). Luftman and Brier (1999) define business—IT alignment as applying IT appropriately and in a timely manner, in harmony with business strategies, goals, and needs. Studies thus far have suggested responsibility for business—IT alignment in both BPG and ITG frameworks.

The definition of ITG explicitly underlines business–IT alignment as the ultimate outcome of enterprise governance of IT (Van Grembergen & De Haes, 2009). Highly aligned organizations appear

to leverage more mature ITG practices (De Haes & Van Grembergen, 2009). ITG process integration mechanisms enable the alignment of business and IT decisions (Peterson, 2004). Furthermore, the use of liaison positions and a mix of business and IT executives in ITG structure enhance IT managers' understanding of business needs and allow business managers' proactive behavior (Peterson, 2004).

ITG accountability for business–IT alignment clearly overlaps with Spanyi's (2010) description of an essential role for BPG: ensuring that IT investments support the organization's business strategy. To ensure business–IT alignment and the "right type of fit" between business and IT, the overall business strategy must be directly tied to various IT initiatives through business processes and their information requirements (Feurer, Chaharbaghi, Weber, & Wargin, 2000; Luftman, 1996; Tallon, 2007; Trkman, 2010). As a BPM function is responsible for design and implementation of business processes (Kirchmer, 2011), accountability for linking business strategy to IT initiatives naturally falls within the BPG framework.

ITG frameworks are built around the involvement of both business and IT parties in IT decision making to ensure business–IT alignment. Business roles involved in IT decision making are responsible for establishing and communicating strategic direction to IT leaders, and participating in strategic and operational IT decision making for IT principles, IT architecture, IT investment and prioritization, and business application needs (ITGI, 2003; Rau, 2004; Weill & Ross, 2004). Although the ITG research emphasizes the critical role of business parties in business–IT alignment, they do not discuss the contribution of process roles.

Meanwhile, according to BPM research, the general business process structure and strategy, underlying application system architecture, and alignment between the two are decided at the strategy layer of BPM (Burlton, 2010; Tučková & Tuček, 2011). Aligning BPM efforts to strategic business and IT goals, choosing the optimal mix of IT investments based on their contribution to business process improvement, and providing the demand analysis and blueprint for IT implementations are some of the IT-related responsibilities of process roles (Hongjun & Nan, 2011; Korhonen, 2007; Novotny & Rohmann, 2010; Scheer & Brabänder, 2010; Trkman, 2010; Tučková & Tuček, 2011). Therefore, Luftman and Brier (1999) suggest business process managers as typical members of business–IT alignment teams.

Our comparative analysis demonstrates that both BPM and IT management functions are held accountable for business–IT alignment. This indicates important interdependencies between the two functions and the necessity of aligning their governance frameworks.

4.2. IT-enabled business value realization

IT business value refers to the performance impact of IT at the organization and intermediate process levels (Melville, Kraemer, & Gurbaxani, 2004). Evidence shows that IT competencies positively influence organizational performance (Tallon, Kraemer, & Gurbaxani, 2000; Tarafdar & Gordon, 2007). Yet, as IT benefits become primarily absorbed into business processes, it is difficult to identify how IT provides value (Wilkin & Chenhall, 2010). IT value delivery deals with executing the value proposition throughout the delivery cycle and ensures that IT delivers its promised benefits (Posthumus, Von Solms, & King, 2010). The BPM and IT literature suggest responsibility for IT business value delivery within both BPG and ITG frameworks.

On the one hand, IT value delivery is among the principal facets of ITG (Van Grembergen et al., 2004; Wilkin & Chenhall, 2010). Charge-back arrangements, IT performance measurement in terms of business benefits, and benefit management and reporting during and after implementation of IT projects are some of the ITG processes that enable IT business value delivery (De Haes & Van Grembergen, 2009; Peterson, 2004; Spremic, 2009). Research on ITG argues that only business managers and users can be held accountable for realization of business benefits enabled by IT investments, and therefore call for their higher level of involvement in IT projects (e.g., Weill & Ross, 2009). More specifically, Rau (2004) assigns accountability for realization of IT-dependent business goals to non-IT roles with a seat in ITG structure. This is because benefits from IT investments mainly emerge from changes to ways of working and only those who instigated these changes can realize the benefits (Peppard, Ward, & Daniel, 2007; Wilkin & Chenhall, 2010).

On the other hand, Spanyi (2010) suggests an essential role of BPG to ensure that the payoff from IT investments is directly derived from specific improvements in business process performance. As first-order impacts of IT arise at the business process level (Melville et al., 2004; Tallon, 2007), IT business value will only emerge when new and adequate business processes are designed, executed, and monitored (Masli et al., 2011; Spremic, 2009; Van Grembergen & De Haes, 2009). Because accountability for ensuring the proper design, implementation, execution, and monitoring of business processes falls within BPG frameworks (Kirchmer, 2011), BPG must obviously comprise the monitoring processes for IT business value delivery. BPG is the essential foundation to ensure sustainability of process innovation and improvements and continuous focus on creating value for all stakeholders (Krichmer, 2010; Tregear, 2009). More specifically, it is typically the responsibility of process owners to monitor the operating performance and continuous improvement of business processes by which the organization delivers value (Scheer & Brabänder, 2010). These arguments suggest process roles responsible for making effective use of the technology for executing business processes to realize IT-enabled business value.

Again a comparison among accountabilities specified in the two governance frameworks indicates that responsibility for IT-enabled business value delivery resides both with the process roles specified within a BPG framework and non-IT roles involved in IT decision making. This suggests the need for coordination and integration between BPM and IT management functions for IT-enabled business value realization.

5. Case study: how do BPM and IT management functions collaborate?

Findings from our comparative literature analysis on ITG and BPG suggest an overlap in the accountability of BPM and IT management functions for business–IT alignment and IT-enabled business value realization. This raises the question of how BPG and ITG frameworks enable collaboration between BPM and IT management functions for accomplishing the joint accountabilities. To answer this question, we investigated Gamma, which is a leading multinational corporation with a long history in actively managing its business processes and IT systems.

Gamma is represented by 80 companies in more than 55 countries. Business units are specialized by sales offices, production plants, and distribution centers. Consistent with its specialized resource configuration, the corporate organizational structure is a functional one wherein sales and marketing, operations, business development, finance, and people and strategy constitute the main functional domains.

In 1995, Gamma started a journey towards business excellence. The excellence program led to several other initiatives in the corporation, including a new discipline for managing business processes. Perceiving business processes as the means for strategy execution, Gamma set up a well-defined governance structure in which the functional managers were specifically tasked with managing business processes within respective business areas.

Approaching the year 2000 and the Y2K challenge, Gamma launched another project to implement a single-instance Enterprise Resource Planning (ERP) system across business units, which accelerated the BPM effort. Rolling out the single-instance ERP was not only about technology standardization, but about business process standardization and data integration. Consequently Gamma developed a global template of best practices to be rolled out across the corporate business units. The unification of IT solutions also demanded centralized IT decision making; therefore Gamma established a centralized ITG structure comprising business and IT representatives from corporate, regional, and local levels. The centralized ITG has since improved IT alignment with corporate business strategy. However, situated within corporate Finance, IT has a limited role in driving business strategy, and product and service development.

The next subsections present a brief description of the two governance frameworks, followed by a description of the devices that integrate BPM and IT management functions in Gamma. Throughout this section the term "process governance" refers to the roles and decision-making processes for the management of business processes, whereas the term "IS governance" reflects the governance structure and processes for directing IT management. As the interviewees mostly originated from operations, the findings likely best represent the governance frameworks in this functional domain, which has the longest BPM history in Gamma.

5.1. Process governance

BPM is an integral part of Gamma's management. Rather than considering BPM an isolated initiative for process improvement, Gamma treats BPM as a holistic approach to ensure the continuous adaptation of business processes to the changing environment. Achieving this requires a clearly described governance embedded in the organizational structure. In Gamma, first and foremost, the executive vice president owns the business processes, indicating BPM sponsorship at the highest level of corporate management as suggested by Doebeli et al. (2011) and Scheer and Brabänder (2010). The executive vice president delegates responsibility for management of business processes and BPM activities to senior functional managers. Fig. 2 illustrates the process roles and committees responsible for BPM in each functional domain.

In each functional domain, the functional vice presidents or their directors assume the role of process owners. In this way, the overall responsibility for BPM is assigned to senior managers who are also in charge of formulating functional business strategy. Consistent with Burlton's (2010) description of the role of a process executive, Gamma's process owners manage a logical group of business processes at the value chain level and are responsible for their overall performance. They define strategies and translate them into action for various process areas, drive the execution of BPM initiatives within their respective function, and monitor performance of corporate business units.

Each process owner heads a group of process managers, each accountable for a specific process area. Working more at an operational level, business process managers are the ones responsible for activities along the BPM cycle. This is in line with Burlton's (2010) definition of process stewards and Hammer and Stanton's (1999) definition of process owners: those responsible for design of business processes and their guides and enablers, and assessment of their continuous fitness to the business requirements. Process managers also assist the process owners with the strategy development. Each process manager together with a few process consultants drives one or more process networks comprising representatives from regions or local business units. Representatives in a process network are responsible to communicate the process requirements of their respective region or business unit and assist the process manager with design and improvement of business processes.

5.2. Information system governance

IS governance in Gamma is a part of corporate governance. It follows a hybrid model and is structured around the five IT decision domains suggested by Weill and Ross (2004). While the corporate IT managers hold decision-making rights for IT architecture and infrastructure, the corporate and local business representatives play a major role making decisions about IT project prioritization and business application needs, and providing input for IT principles, IT investment, and IT architecture decision making. Fig. 3 illustrates Gamma's IS governance structure that brings together business representatives and corporate IT managers and consultants.

A business process owner group, a few business area forums, and several subject matter expert groups represent each functional domain in the IS governance structure. The business process owner group, comprising the functional vice presidents, their directors, or both, and in some cases the global or local managers, are responsible for communicating the functional business strategy to set the direction for defining IT strategy. Other responsibilities of these groups include managing the IT projects portfolio and IT budget for their respective function. Members of a business process owner group join their functional middle managers in the business area forums where there is a more dedicated focus on the IT strategy for a specific business area. Cooperating more at an operational level, the subject matter expert groups communicate the business process requirements at the global and local levels to the IS consultants to guide the application development and configuration.

The IS delivery managers own the IT delivery area strategy. The IS reference board – consisting of the chairpersons of business process owner groups, CIO, and business relations managers – is in charge of cross-functional IT business projects, consolidation of the IT business project portfolio, and managing the overall budget for IT projects. The IS management with the participation of the CIO and IT directors make decisions on technical aspects of IT projects.

5.3. Integration between process governance and IS governance

In Gamma, two distinct but tightly integrated governance frameworks direct BPM and IT management. As illustrated in Fig. 4, some of the business liaison positions in the IS governance structure are held by the business representatives who also seat in the process governance structure. While their responsibility in the IS governance framework is limited to IT decision making, in the process organization they are responsible for the broader aspects of design, control, and optimization of business processes.

Each functional business process owner group in the IS governance structure comprises that functional area's process owners. The process owners are also included in the various business area forums. Process managers may also be present in the business area forums. Process managers and process consultants, potentially together with respective process networks of local or regional representatives, fill in the various subject matter expert groups situated within the IS governance structure.

Taking the business liaison positions in the IS governance structure, the process roles have the official authority to align IT decisions with those in the process organization. At the strategic level, the process owners direct the IT strategy based on the business strategy and BPM plans. At the operational level, the process managers and consultants guide the IT system design and application configuration based on process requirements. We also found that the IS consultants are involved in BPM activities. IS consultants not only collect process requirements, but are also involved in pro-

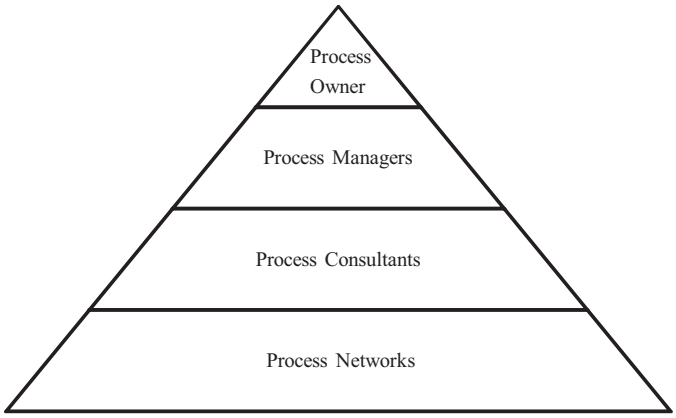


Fig. 2. Process organization in Gamma.

cess design and development from early stages, and provide the process roles with an understanding of IT systems' potential support for business processes. They may even direct process design activities based on the best practices embedded in IT systems. However, while actively assisting business process managers and process networks in BPM decision making, IS consultants' position in the process governance structure is not well formalized.

In line with our findings from the comparative literature study, in Gamma the collaboration between process and IS organizations enables business–IT alignment. The case study shows that the business liaison positions in the IS governance structure taken by process roles and less formalized IT liaison positions considered in the process governance structure facilitate joint decision making for IT principles, IT investments, IT architecture, business application needs, and process design. Managing IT-enabled business value realization is still a novel concept in the corporation; therefore, no role within process or IS governance structures has the clear responsibility for IT business value delivery.

5.4. Properties of integration between process governance and IS governance

In the next step of data analysis we examined the case data to identify properties of integration between process and IS organizations. We especially investigated governance mechanisms that enabled involvement of process roles in IT decision making and those that facilitated engagement of IS managers and consultants in BPM activities. This analysis led to identification of two integration properties: the direction of integration, and the planning level at which process and IS organizations integrate. Noticing a difference in direction of integration at strategic and operational planning levels, we further analyzed the case data and identified IT role as the mediating factor. Fig. 5 provides a more detailed description of concepts emerged during open and axial coding. The first-order concepts emerged from open coding raw data; comparing and contrasting these concepts led to the emergence of second-level themes; and an aggregation of these themes were used to define the properties of the focal concept, namely integration between BPM and IT management functions. While these properties emerged from the case data, especially after visualizing the interactions in Fig. 4, we were also inspired by previous studies on business–IT alignment when characterizing them (e.g., Henderson & Venkatraman, 1993; Tarafdar & Qrunfleh, 2009; Teo & King, 1997; Weiss et al., 2006). The next three subsections describe the three concepts as the axes of understanding integration between BPM and IT management functions.

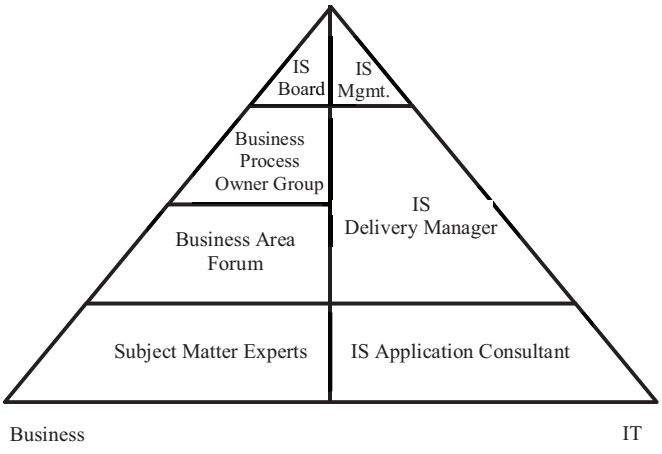


Fig. 3. IS organization in Gamma.

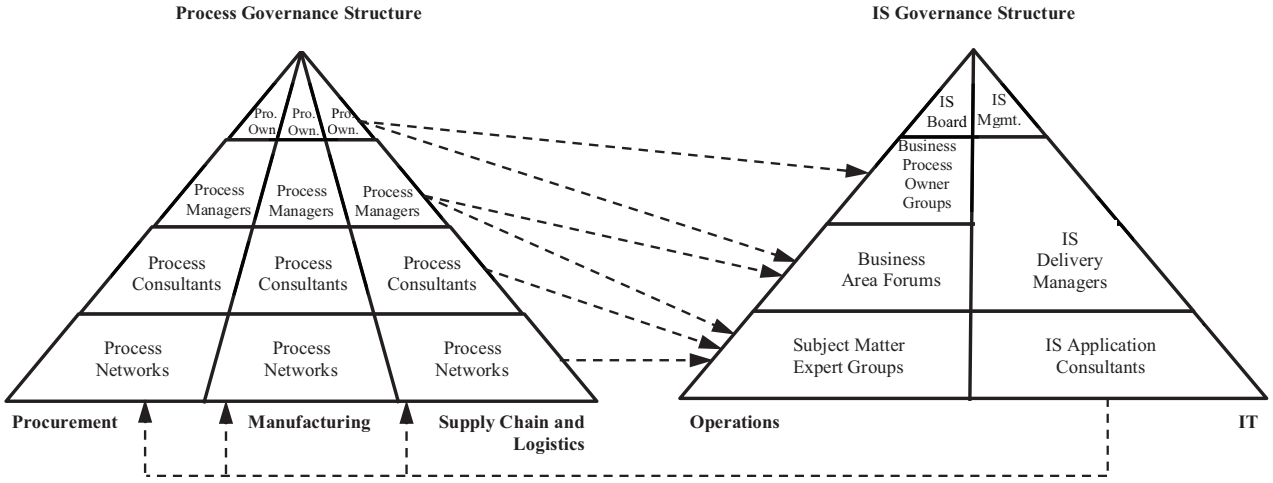
5.4.1. Planning level of integration

The first property of integration pertained to the planning level at which BPM and IT management functions collaborate. The case study illustrates that the relationship between process and IS organizations is not only a question of strategic but also of operational alignment. At the strategic level, process owners and process managers along with other business executives in business process owner groups and business area forums join the IT managers to translate business strategy into IT strategy and make decisions about IT architecture, and IT investment and prioritization. At the operational level the contacts between IS consultants and process managers, process consultants, and process networks are mainly for joint decision making on business application needs, process design, and IT system design. Fig. 5 illustrates the first- and second-order concepts that resulted in the emergence of this property.

While this property emerged from the case data, it is not entirely new. Few studies on business–IT alignment have already distinguished between the strategic and operational dimensions of integrating business and IT (Schwarz, Kalika, Kefi, & Schwarz, 2010; Tarafdar & Qrunfleh, 2009; Wagner, Beimborn, & Weitzel, 2014). Characterizing this property, we were especially inspired by Tarafdar and Qrunfleh (2009) and their suggestion for a two-level business–IT alignment analysis. While strategic integration ensures alignment between business and IT strategies, operational integration makes sure that the strategically planned applications are effectively deployed (Tarafdar & Qrunfleh, 2009). The strategic perspective focuses on alignment among high-level executives, and operational alignment is the concern of project teams and IT and business professionals involved in business processes (Wagner et al., 2014). While reinforcing previous studies on the business–IT integration, the case study illustrates a more specific integration between BPM and IT management functions, ensuring synchronization of BPM and IT plans at the strategic level and effective support of IT applications for business processes at the operational level.

5.4.2. Direction of integration

The second property of integration concerns direction of integration between BPM and IT management functions. Investigating the integration between the two functions at strategic and operational levels, we faced differences at the direction of integration between two levels. At the strategic level, integration between process and IS organizations is sequential: the business strategy and BPM plans direct IT strategy and are indisputable inputs for IT decision making. The IS governance structure includes business liaison positions to enable involvement of business roles, and among all process roles, in IT decision making. In contrast, IT managers have negligible influence on defining the business strategy and developing BPM plans. However, at the operational level, collaboration



Process Governance Roles and Committees	IS Governance Committees: IS Board	Business Process Owner Group	Business Area Forum	Subject Matter Expert Group
Senior Process Owner (Functional Vice President)	X	X		
Process Owner (Functional director)		X	X	
Process Manager			X	X
Process Consultant				X
Process Network				(X)

Fig. 4. Integration between process governance structure and IS governance structure in Gamma.

between process and IS organizations has a reciprocal nature. One the one hand, taking business liaison positions in the IS governance structure, process roles have the possibility to communicate process requirements and application needs, and participate in IT system design. On the other hand, IS consultants also play an active role in influencing process design based on IT systems' capabilities. Indeed IS consultants significantly influence process design based on ERP best practices. Fig. 5 provides a more detailed description of the concepts that led to the emergence of this property.

Although this property emerged during data analysis, typifying this property we were inspired by Teo and King (1997) and their concept of direction of integration between business and IT planning processes. One-way reactive or sequential integration was the first attempt for integrating business and IT planning processes to enable deriving IT strategy from business strategy (Teo & King, 1997). Later the recognition that IT planning can be used not only to support but also to influence business strategies led to the two-way reciprocal integration between business and IT planning (Teo & King, 1997). Other studies took this concept even further and suggested the concept of full integration, where the IT planning process is indistinguishable from the business planning process (Teo & King, 1997). The case study shows that this concept can also be used to explain the direction of integration between BPM and IT management functions at the strategic and operational planning levels.

5.4.3. Role of IT in alignment

Facing variances in the direction of integration between BPM and IT management functions at the strategic and operational levels, in the third stage of data analysis, we probed the contextual factors that caused the difference. Keeping "constant comparison" in mind (Corbin & Strauss, 2008), we identified an association between integration direction and the perceived role of IT in business–IT alignment. In the studied organization, IT as a business enabler is aligned with business requirements, not the other way around. Statements such as "the business requires certain things from IT and not reversed" and "whatever the process organization comes up with IT will have to align with" indicate such perceptions toward IT in Gamma. IT is mainly responsible for developing and maintaining "systems of record" and is not a driver of business transformations based on emerging IT trends. Therefore at the strategic level, there is only a sequential integration between the two functions to align IT strategy with business strategy and BPM plans. This one-way alignment is enabled by including process roles in IS governance structure to ensure their involvement in IT strategic decision making.

While IT strategy follows business strategy, we found the IT function to be more proactive at the operational level. On the one hand, process roles have input right for business application needs and configuration. One the other hand, IS consultants are highly involved in designing business processes. Therefore, at the operational level the integration between the two functions is reciprocal, enabled through liaison positions situated within both process and IS governance structures. We associate this to the empowering impact of off-the-shelf IT systems and their embedded best practices and functionalities. The rollout of a single-instance ERP was a part of business excellence program in Gamma. To improve integration and exploit economies of scale within business and IT, Gamma needed common standards for business processes and data. Finding a convenient match between business requirements and best practices embedded in the ERP system, Gamma decided to define the global template based on the best practices. In addition, to avoid maintenance issues, the ERP implementation strategy strictly forbade any custom code development unless the system did not meet

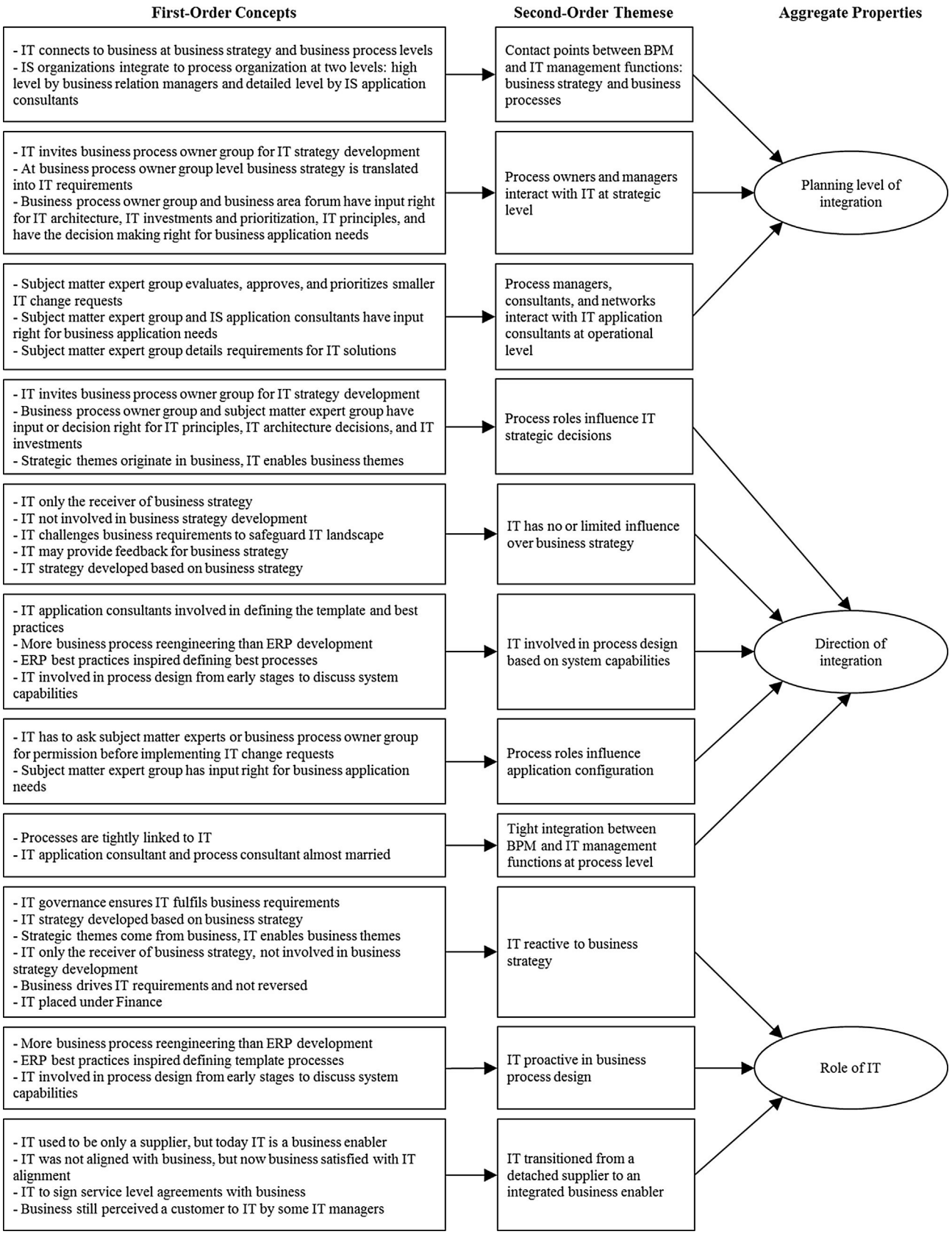


Fig. 5. First- and second-level concepts from data analysis and emergent integration properties explaining integration between BPM and IT management functions.

critical business requirements. These have empowered the IS consultants to play an active role in business process design to enforce the standard IT solutions.

Identifying IT role as the mediating factor, we were inspired by previous studies that investigated the role of IT in various business–IT alignment scenarios. Teo and King (1997) highlight the association between strategic potential of IT and business–IT integration forms. Henderson and Venkatraman (1993) distinguish between four perspectives for aligning business and IT strategies and organizational and IT infrastructures, depending on whether business is the driving force for IT capabilities or IT is the enabler of new business strategies and structure. Weiss et al. (2006) as well define three business–IT alignment profiles: technical resource, business enabler, and strategic weapon. They describe these profiles in terms of the degree of IT alignment internally with the business, and externally for market engagement. Our analysis suggests the role of IT to also explain our focal concept, namely integration between BPM and IT management functions.

6. Conceptualizing integration between BPM and IT management functions

Findings from the case study indicate that integration between BPM and IT management functions to support business–IT alignment can be explained by integrating three concepts: the planning level of integration, direction of integration, and role of IT. In this section, we use the three concepts to conceptualize the integration between the two functions.

Henderson and Venkatraman's (1993) strategic alignment model suggests the need for a strategic fit between business and IT strategies and business and IT structure and processes. Given this model, we argue that the way an organization positions itself to shape and enact the business strategy through IT influences integration between business and IT organizational structures — herewith the integration between BPM and IT management functions. Adopting Weiss et al.'s (2006) notion of the alignment profile, we argue that the integration between BPM and IT management functions must be adjusted based on the three roles of IT: technical resource, business enabler, and strategic driver. Using the three concepts derived from the case study, we propose a model that explains the integration between BPM and IT management functions in support of business–IT alignment.

To conceptualize the integration, we use analytical generalization (Yin, 2009). In this understanding, the validity of the proposed model does not depend on the representativeness of the case in a statistical sense, but on the plausibility of the logical reasoning (Walsham, 1993). Drawing on a theoretical analysis of the integration properties in relation to the case organization's context, we will make projections about transferability of the findings to other cases. We enfold the extant literature and compare our propositions with existing theories to strengthen internal validity and wider generalizability of the suggested theory.

Table 4 illustrates the proposed model. Our model is based on disaggregating and recombining the dimensions of planning level of integration, direction of integration, and role of IT. The rows represent the IT role and the columns indicate the strategic and operational planning levels of integration. For each combination of the IT role and planning level, we explain the direction of integration between BPM and IT management functions in terms of both the structural and process integration. In developing this model, we limit the role of IT to business enabler and strategic driver as described by Weiss et al. (2006). We do not expect any integration between BPM and IT management functions in organizations where IT is solely considered a technical resource. This is because such organizations do not deploy IT to support core business processes, but rather to support routine administrative work (Weiss et al., 2006). Considering the significant role of IT in driving and enabling business processes and supporting BPM initiatives (Davenport, 1993; Hammer, 2010; Niehaves, Plattfaut, & Becker, 2012), the absence of IT support for core business processes in an organization may even indicate the absence of a BPM function. Despite the lack of integration between BPM and IT management functions, business and IT organizations may still have limited administrative integration for communicating administrative automation requirements, as described by Teo and King (1997).

In organizations that perceive IT as a business enabler, IT strategy only reacts to business needs (Weiss et al., 2006). When business strategy is the driver of IT strategy, Henderson and Venkatraman (1993) and Ross and Feeny (1999) limit the role of IT managers to strategy implementers who ensure that IT aligns with business strategy. Therefore when organizations use IT as a business enabler, we argue for a sequential integration at the strategic level between BPM and IT management functions. In such cases, as the IT strategy needs to be aligned with the business strategy and thereby BPM plans, the high-ranking process roles are imposed on the ITG structure to communicate the BPM strategy and plans to IT managers and to take part in IT strategic decision making. Because IT strategy is a second-order consequence of business strategy and BPM plans, the process for strategic business and BPM planning provides direction for the strategic IT planning process.

When IT acts as a business enabler, we expect a reciprocal integration between BPM and IT management functions at the operational level. This is because such organizations deploy IT primarily to support core business processes and to improve their performance through greater efficiency and improved customer service (Weiss et al., 2006), and therefore strive for integrated low-cost transaction systems and analytic tools that assist with identifying new customer segments and offerings (Weill & Ross, 2004). Use of off-the-shelf systems such as enterprise resource planning and customer relationship management systems is common to support such strategies (Weill & Ross, 2004). When implementing such systems, the system development effort is reduced to enabling the required functionality embedded within the systems (Holland & Light, 1999). Due to limited system design and negative impacts of excessive system adaptation on implementation success (Hong & Kim, 2002), IT consultants can considerably influence business process redesign based on best practices embedded in such IT systems. Therefore, when IT is used as a business enabler we argue for reciprocal or even full integration between processes for IT system design and process design. To facilitate this, the ITG framework includes BPM liaison positions to enable communicating process requirements, while simultaneously the BPG structure incorporates IT liaison positions to ensure that IT professionals are also involved in process design.

Organizations that use IT as a strategic driver subsume IT into business strategy and exploit it for business transformation and introducing new products and services (Henderson & Venkatraman, 1993; Weiss et al., 2006). When IT plays a transformational role, the CIO is a valuable member of the executive team, and not only aligns IT with business strategy but serves also as a driver of business strategy (Ross & Feeny, 1999). In such organizations, IT managers play the role of catalysts who assist business managers to understand potential opportunities and threats from an IT perspective (Henderson & Venkatraman, 1993). In such cases we argue for a two-way integration between BPM and IT management functions at both strategic and operational levels. Not only the ITG framework includes BPM liaison positions in its structure, but also IT liaison positions are situated in the BPG structure to facilitate IT managers' contributions to strategic and operational BPM decision making. There is also either reciprocal or full integration between BPM and IT strategic planning processes. BPM and

Table 4
Strategic and operational integration between BPM and IT management functions: the role of IT matters.

IT Role	Planning Level of Integration: Strategic Planning	Planning Level of Integration: Operational Planning
Business Enabler	**Sequential** * BPM involvement in strategic IT decision making supported through BPM liaison positions situated in the ITG structure * BPM strategic planning directs IT strategic planning	**Reciprocal** * IT involvement in process design and BPM involvement in IT system design through IT and BPM liaison positions respectively situated in BPG and ITG structures * Process design both influences and is influenced by IT system design
Strategic Driver	**Reciprocal** * BPM involvement in strategic IT decision making and IT involvement in setting BPM strategic plans supported through BPM and IT liaison positions situated in the ITG and BPG structures * BPM strategic planning both influences and is influenced by IT strategic planning	**Reciprocal** * IT involvement in process design and BPM involvement in IT system design through IT and BPM liaison positions respectively situated in BPG and ITG structures * Process design both influences and is influenced by IT system design

IT strategic planning processes are either interdependent, so that IT plans both support and are supported by BPM plans, or fully integrated, so that BPM and IT strategic plans are developed concurrently in the same integrated planning process. This is also true for the processes handling business process design and IT system design.

7. Discussion

Our comparative literature analysis detected an overlap in accountabilities specified within BPG and ITG frameworks for business–IT alignment and IT-enabled business value realization. While the case study could not support joint responsibility for monitoring business process and IT systems, it illustrated collaboration between BPM and IT management functions for business–IT alignment at the strategic and operational levels. The liaison positions situated in the BPG and ITG structures and the aligned BPM and IT planning processes were the primary enablers for the collaboration. Therefore, while reinforcing previous studies on the importance of business–IT partnership for alignment, we specifically suggest process roles as important stakeholders in business–IT alignment activities. We also suggest coordination and collaboration between BPM and IT management functions to rely on horizontal integration capabilities designated in the BPG and ITG frameworks. While in this study we only focused on structural and process integration capabilities, relational mechanisms that enable cross-domain knowledge sharing and communication are other means to enable collaboration between BPM and IT management functions. Previous studies have already illustrated the importance of relational mechanisms for attaining and sustaining business–IT alignment (e.g., De Haes & Van Grembergen, 2009).

While recognizing the need for mutual adjustment between BPM and IT management functions for business process and IT decision making, our study suggests that the direction of integration at strategic and operational planning levels and thus the choice of integration mechanisms depend on the role of IT in an organization. We suggest that at the strategic planning level, IT as a business enabler requires a sequential integration between BPM and IT management functions, and IT as a strategic driver gives rise to reciprocal integration. While sequential integration ensures alignment of IT strategic decisions with business initiatives, reciprocal integration also enables shaping business and BPM strategic initiatives based on new or improved uses of IT. At the operational level, we propose that IT as both a business enabler and strategic driver encourages reciprocal integration between BPM and IT management functions. Reciprocally integrated BPM and IT management functions ensure IT systems design in line with business requirements while simultaneously exploiting IT potentials for improving business processes.

These findings have three theoretical implications. First, our study reinforces earlier studies on business–IT integration, and further suggests process roles as one of the most important stakeholders for enabling business–IT alignment and therefore inclusion of BPM liaison positions in ITG structure. Second, while supporting previous studies that emphasize the importance of IT professionals' understanding of and involvement in business planning and business executives and users' participation in IT planning to support business–IT alignment (e.g., Teo & Ang, 1999, 2001; Teo & Ang, 2001; Ranganathan & Kannabiran, 2004), this study proposes the role of IT as influential in the direction of integration and thereby applicability of these integration mechanisms. Third, while the horizontal integration capabilities in the ITG structure enable involvement of business parties in IT decision making (De Haes & Van Grembergen, 2009; Peterson, 2004), they are not sufficient to facilitate IT involvement in business and business process decision making. Consistent with Kooper, Maes, and Lindgreen's (2011) proposition concerning ITG inadequacy for information management, we do not consider ITG concerned with the management of business processes. Therefore, because IT typically plays an important role in business process design – as indicated in the case study – and because the growth in digital economy is increasing the importance of IT for business development (Blosch & Burton, 2015), we suggest the situation of IT liaison positions in business governance structures and herewith BPG structure to enable IT involvement in BPM decision making.

The low maturity of selected corporation with respect to IT benefit management made it unsuitable to study integration between BPM and IT management functions in support of IT-enabled business value delivery. However, we argue that IT-enabled business value realization can be enabled using BPM and IT liaison positions in ITG and BPG structures and aligning governance processes for IT benefit management and business process monitoring. Indeed, ITG frameworks already include liaison devices in support for IT value delivery (De Haes & Van Grembergen, 2009). Previous studies also suggest the use of process-level indicators to measure IT-enabled business value (e.g., Masli et al., 2011; Tallon et al., 2000).

8. Conclusion

A growing body of literature has emphasized IT involvement in BPM activities on the one hand and process roles engagement in IT decision making on the other. However, we identified limited discussions on why and how BPM and IT management functions collaborate. Drawing on our findings from a comparative literature analysis and case study, we suggest the need for horizontal contacts between BPM and IT management functions to align strategic and operational decisions on business processes and IT. The study also tentatively proposes the need for integration between the two management functions to support IT-enabled business value delivery. We further associate the direction of integration between BPM and IT management functions at strategic and operational levels with the role of IT in an organization. Relying on findings from the literature analysis and the "force of example" (Flyvbjerg, 2006), our study suggests the need for a new perspective defining BPG and ITG frameworks and draws attention to their interoperability to coordinate formal and informal IT and business process decision-making authority across IT and process parties.

While the study provides interesting insights into why and how BPM and IT management functions collaborate, there are certain limitations. Although we consider the single case study sufficient to point out neglected integration between BPM and IT management functions and overlooked associations between BPG and ITG frameworks, studies that examine multiple cases are necessary to refine our findings. Additional studies are needed to validate our theory of integration between BPM and IT management functions, especially in the context of organizations where IT actively drives business strategy. Future research may even reveal other contextual factors aside from the role of IT that influence the nature of alignment between BPM and IT management functions. Corporate governance model and BPM and IT management maturity are some potential factors that may influence the integration between BPM and IT management functions.

Next, this study suggests the need for inclusion of IT liaison positions in the BPG structure to enable IT involvement in BPM activities. While there are numerous studies on ITG and its horizontal integration capabilities, BPG has received far less attention from academia. Therefore, future studies could explore the BPG structural, process, and relational integration mechanisms that enable IT involvement in BPM decision making.

Finally, the case selection was not ideal to investigate collaboration between BPM and IT management function for IT-enabled business value realization. While we are still content with our case selection as it could illustrate one aspect of the collaboration, we encourage repeating the study in organizations with a mature approach toward IT benefit management.

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PAPER V

Enterprise Architecture Management: Toward a Taxonomy of Applications

Submitted for the second round of review to

Enterprise Architecture Management: Toward a Taxonomy of Applications

Abstract:

Despite the growing interest in enterprise architecture management, researchers and practitioners lack a shared understanding of its applications in organizations. We associate disagreements on applications of enterprise architecture management with different perspectives on enterprise architecture scope that may span IT, business capability, and business strategic elements of an organization. Building on findings from a literature review and eight case studies, we develop a taxonomy that categorizes applications of enterprise architecture management based on three classes of enterprise architecture scope. Organizations may adopt enterprise architecture management to support IT strategy formation, planning and implementation; facilitate business strategy planning and implementation; or further complement the business strategy formation process. The findings indicate a trend for advancing applications of enterprise architecture management in organizations and a change in enterprise architects' identity.

Keywords: Enterprise architecture, Enterprise architecture management, Application, Taxonomy, Case study

1 Introduction

Interest in enterprise architecture (EA) has grown significantly since the Zachman Framework was introduced in the 1980s (Simon et al., 2014). Organizations are increasingly adopting enterprise architecture management (EAM) concepts to coordinate enterprise-wide transformations of their complex business and IT asset landscapes (van der Raadt and van Vliet, 2009). However, researchers and practitioners still lack a common understanding of EA's meaning and scope (Lapalme, 2012). In the literature, the term EA is used to refer to anything from the property of an enterprise and its inherent structure (e.g., Bradley et al. 2012), to description of an enterprise in terms of its composition and structure (e.g., Bernard, 2012), and to processes for its management and evolution (e.g., Lapkin et al., 2008). EA scope also ranges from IT components (Richardson et al., 1990), to business processes and organizational structure (e.g., Lankhorst, 2005), and to business strategy, vision, markets, and products and services (e.g., Simon et al., 2014). The differences in perspectives on EA have also resulted in diverse views of EAM goals and applications, roles and responsibilities of enterprise architects, and the integration of EA functions into organizational governance.

Despite the fact that EA scope may span both business and IT realms, EA is traditionally considered equivalent to IT architecture. Organizations often adopt EAM to support management of IT architecture design and evolution (Heiß, 2015; Simon et al., 2014). Among the practitioner studies with an IT view of EA is Gartner's typology of vanguard and foundational architects (Blosch and Burton, 2014). The IT-centric view of EA and EAM applications is also dominant in EA academic research (e.g., Boh and Yellin, 2006; Richardson et al., 1990). However, some studies indicate a change in perspective on enterprise architects' responsibilities from supporting IT architecture evolution toward facilitating strategic transformations (e.g., Simon et al., 2014; Strano and Rehmani, 2007; Wagter et al., 2012; Wißotzki et al., 2013). This turns EAM into an approach for systematic development of an organization as a whole.

The ambiguity of the term EA and confusion around EAM applications served as motivation for us to conduct a study to clarify the terminology and various applications of EAM in organizations. In this quest we asked and answered two questions: What does EA mean? How do organizations use EAM (i.e., for what objectives)? To answer these questions, we first conduct a structured literature review to compare various perspectives on the term EA and different views of EAM applications among EA researchers. A synthesis of the literature results in a taxonomy that classifies EAM applications based on three perspectives on EA's scope. We then examine the taxonomy using case studies of eight Danish organizations that actively manage their EA. The case studies provide empirical support for the suggested taxonomy and enable its further refinement. The proposed taxonomy suggests that EAM may complement processes for IT strategy formation, planning and implementation; business strategy planning and implementation; and business strategy formation, depending on whether EA scope covers IT, business capability, or business strategic elements of an organization. The taxonomy sheds light on the wider range of EAM applications, rectifies confusion among researchers and practitioners about EA and EAM applications, and assists managers in conscious decision making about EAM adoption based on their goals and requirements.

The remainder of the paper is organized as follows. In section 2 we describe our research methodology for developing the taxonomy. In section 3 we present the literature review in terms of the diverse perspectives on the meaning and scope of EA, followed by the three archetypes of EAM applications derived from synthesis of the literature. We then describe cases and findings from cross-case analyses in section 4. Drawing on the empirical findings, section 5 revises the suggested taxonomy. Section 6 provides a discussion of contributions and their grounding in the literature. Section 7 concludes with a summary of contributions, limitations, and potential extensions of the research.

2 Research Methodology

We conducted the current study in three stages as depicted in Figure 1. This section presents our research methodology for each stage.

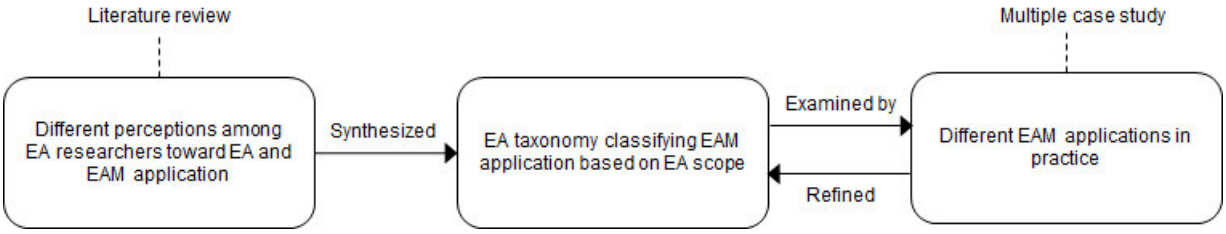

Figure 1. Methodology and Contribution of Paper

First, to understand diverse perspectives on the meaning of EA and application of EAM, we conducted a comprehensive literature review of scientific journals and conference publications available via the Web of Science and Scopus. As illustrated in Figure 2, after scanning titles and abstracts of papers identified through database searches and citations trailing relevant papers, the first author retrieved more than 240 papers for full text review. She then selected more than 80 papers for analysis based on relevance of the topic and her subjective judgment regarding originality, methodological rigor, and theory robustness. Appendix A provides the list of selected papers. She carefully analyzed and coded each paper, seeking especially concepts such as EA and EAM definitions, EA scope, EAM applications, and EAM governance and functional roles and responsibilities. Appendix B presents the codebook she used for analyzing the selected papers. Developing the codebook, she followed the approach suggested by Guest and MacQueen (2007). Also following Corbin and Strauss's (2008) approach for coding, she supplemented each code with extensive memos describing her understanding and critical assessment of the paper's perspective on the concept and its comparison with other papers. Each memo also reflected on dimensions and properties of the concept. Subsections 3.1 and 3.2 present a comparison of various definitions of EA and assumptions about EA scope as identified through literature analysis.

Second, upon analyzing EA definitions and comparing different notions of EA scope specified in the literature, we identified three perspectives on EA scope among researchers. Assuming that a given view of EA scope influences EAM goals and applications, we categorized the literature based on their perception of EA scope and created mapping between EA scope and EAM application. We structured the findings as a taxonomy that classifies various applications of EAM based on three classes of EA scope. This taxonomy is presented in subsection 3.3.

Third, to examine and refine the taxonomy and to understand the applications of EAM in practice, we conducted case studies in eight large Danish organizations with discrete EA functions. As practitioners have very different understandings of EA and adopt EAM for varied purposes, we found the topic too complex to be investigated through a survey. We also found the case study to be a more suitable approach due to our focus on organizational aspects of EAM, and our objective of understanding EAM in conjunction with its context (Benbasat et al., 1987; Orlikowski, 1992; Yin, 2009).

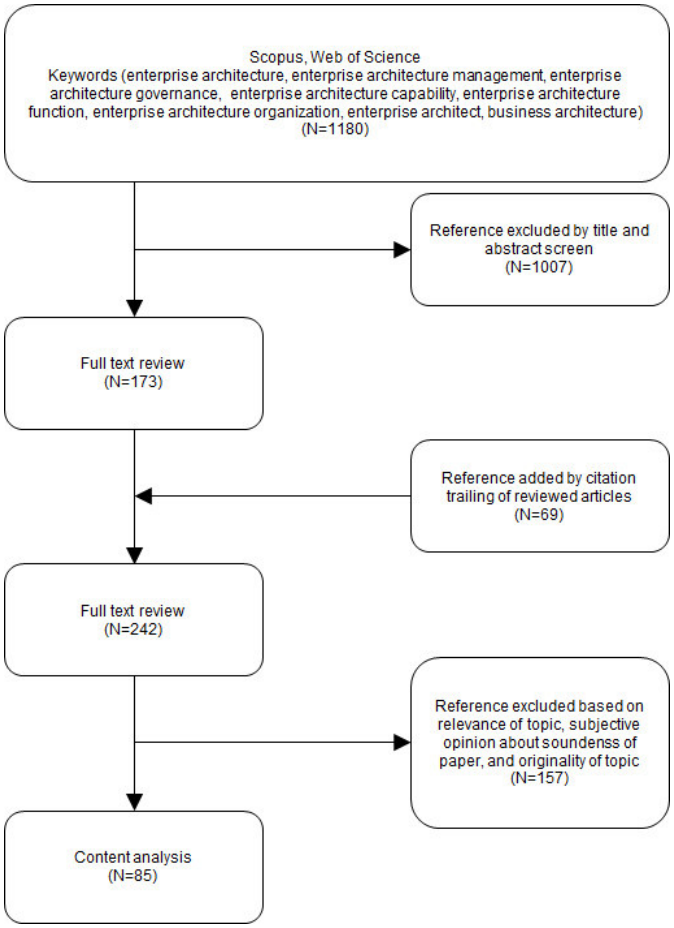

Figure 2. Literature Search for EA-related Topics

Adopting a theoretical sampling methodology (Eisenhardt, 1989), we based our case selection on the three EA archetypes derived from the literature analysis. Seeking a sample of organizations across which various applications of EAM could be compared, we chose the cases based on prior knowledge of their EAM applications. We also followed a snowball approach (Patton, 1990) and asked the interviewees for organizations in which EAM application was different from their home organization. We continued sampling until we could identify organizations fitting each archetype specified in the taxonomy. Therefore the selected cases are polar types chosen to fill theoretical categories (Eisenhardt, 1989). Focusing only on large Danish corporations reduced potential variation in approach toward EAM linked to size (Aier and Schelp, 2010). All selected cases had a centralized IT function; they varied by industrial sector, and overall organizational governance model and extent of centralization in business decision making. As the latter factors could have an impact on the organization's approach in adopting EAM (Haki et al., 2012), we focused special attention on them during data analysis.

We used semi-structured interviews as the primary method of data collection. Because of the small number of interviews and interviewees, we did not expect to attain an in-depth understanding of each case. Instead, we aimed at understanding the EA function's mission, organizational position and makeup, responsibilities and accountabilities, involvement in business and IT strategy development and project execution, and major challenges. While the interview guide generally covered the same topics in each interview, we adjusted questions to probe specific EAM applications in each organization and to allow for investigating emergent concepts from earlier interviews. Appendix C presents the interview guide covering the topics and key questions directing the interview under each topic. Table 1 presents the case organizations and respective interviewee positions.

From April through June 2015, the first author conducted interviews with EA function practitioners in the eight organizations. A total of 14 interviews were conducted, all of which were recorded and transcribed. (Note: Some of the persons were interviewed more than once or were present during interviews with colleagues.) Follow-up questions occasionally supplemented the interviews to resolve ambiguities and inconsistencies. We were also present at two conferences where three of the case organizations presented their EA functions. This provided the opportunity to conduct some spontaneous informal discussions to enhance our understanding of their EAM activities. However, most of the interview data reported in this paper comes from formal interview transcripts. To exploit the synergistic effects of triangulation and obtain convergent validation from various data sources, we combined interviews with a wide variety of archival sources, including documents on EA function objectives, architects' job descriptions, EAM governance processes, and examples of EA roadmaps and target architecture (Tracy, 2010).

We then carried out data analysis in two stages. During the first stage, we analyzed each case with respect to its EAM approach. The first author manually coded the interview transcripts and supplemental documents. The output of within-case data analysis was a set of codes and memos, each abstracting and analyzing the scope of EA in the case organization, its use of EAM, enterprise architects' responsibilities, and governance approach to EAM, among others. Analyzing the data, she took a middle position between open and theory-determined coding (Dey, 1993). She predefined a set of codes based on the interview guide and also by refining the concepts and properties identified during the literature review. At the same time, she allowed for new insights to arise from the case study data. Appendix D presents the codebook used for analyzing the empirical data.

The confidence in findings could have been improved by having multiple researchers acquiring and coding the case data (Eisenhardt and Graebner, 2007). However, this was not possible due to practical limitations. To achieve triangulation, the study used an alternative strategy suggested by Eisenhardt (1989). According to this strategy, researchers take different roles in the course of data acquisition and analysis to increase the chances of viewing case evidence in divergent ways (Eisenhardt, 1989). During data analysis of the current study, although the first author was the only coder of the empirical data, the second author reviewed and commented on the codes and memos based on his prior knowledge of the cases until both authors could reach a common and more in-depth understanding of each case. The third author did not review the codes, but critically assessed the developed findings as the devil's advocate (Sutton and Callahan, 1987). As the co-authors retained a distant view to the cases, they could bring different and possibly more objective eye to the evidence. Section 4.1 presents each case based on a selected set of concepts. Appendix E also provides quotations from each case's data in relation to various concepts.

Table 1. Cases and Interviewees

Case	Description	Interviewees	Duration of interview(s) (minutes)
Alpha	Global dairy foods producer	Chief architect, enterprise architect	220
Beta	Pension provider and investor	Chief business architect, business architect	120
Gamma	Global apparel company	Chief architect	120
Delta	Global producer of energy solutions	Former chief architect, chief architect	210
Zeta	Energy company	Chief architect, enterprise architect	210
Theta	Global engineering company	Enterprise architect	120
Kappa	Global industrial equipment producer	Business relations manager, information architect, business architect	210
Sigma	Global financial IT service provider	Two market architects	150

In the second stage of data analysis, following Eisenhardt's (1989) suggestion, we compared the cases in pairs based on concepts that identified or emerged during within-case analysis. We used the findings from pair-wise comparisons to classify the cases into five categories. Two factors, EA scope and influence over environment, guided our classification decision. We related EA scope to the breadth of EA function responsibilities covering the design of IT components, business capability elements, business strategy, or a combination of the three. The second factor was associated with enterprise architects' engagement in and influence over decisions in which they do not have formal responsibility. While we derived the first factor from the proposed taxonomy, the second factor emerged during pair-wise case comparisons. The two factors also guided us for mapping cases based on their EA scope. Aggregating only the converging data within each group, we composed narratives describing EA function characteristics and EAM applications in each group. A summary of these narratives can be found in subsection 4.2. We then used the empirical findings to revise the taxonomy, as presented in section 5.

3 Literature Review

Our literature review indicates a large variety of EA definitions and different perceptions of EAM applications. This section presents a summary of the findings from the literature review and analysis. First, we present distinct perspectives of EA among researchers and also our understanding of EA and EAM. Second, we discuss various perspectives on EA scope caused by different understandings of the term "enterprise." Third, categorizing EA scopes into three classes and mapping EAM studies to one of the categories, we propose a taxonomy that explains EAM applications based on EA scope.

3.1. EA Definitions

Table 2 presents diverse definitions of the term EA identified in the literature. Developing the table, we had the first research question of this study in mind: What does EA mean? We only included those retrieved studies in which the author(s) had provided an explicit and original description of EA. Drawing on an analysis of these studies, we identified four strands defining EA as: inherent enterprise structure (e.g., Bradley et al., 2012), blueprint of an enterprise in its various facets (e.g., Rood, 1994), set of principles prescribing enterprise architecture design (e.g., Hoogervorst, 2004), and methodology or process guiding the design of enterprise architecture (Lapkin et al., 2008). We believe these differences originate in lack of agreement on defining "architecture." Therefore, we first probe the definition of architecture.

The Oxford English Dictionary defines architecture as "the complex or carefully designed structure of something." Similarly, ISO 42010:2011 defines architecture as "the fundamental concepts or properties of a system in its environment embodied in its elements, relationships, and in the principles of its design and evolution." Adopting these definitions, we consider EA the fundamental conception of the enterprise in its environment embodied in its elements, their relationships to each other and to its environment, and the principles guiding its design and evolution. Therefore, EA is not a description or a management methodology, but the inherent structure of an enterprise.

EAM then is a management approach that supports planning, developing, and controlling the enterprise's architecture in a coordinated and purposeful manner by providing a holistic understanding of the EA (Buckl et al., 2010; Labusch and Winter, 2013; Lux et al., 2010; Radeke, 2010) and ensuring adherence to EA principles (Hoogervorst, 2004). EAM captures all those processes, methods, tools, and responsibilities needed to allow for consistent development of the enterprise (Simon et al., 2014). Distinguishing between architecture and architecture description, we recognize EA documentation as a set of practices within EAM for expressing the abstract concept of an enterprise's architecture. EA documentation—by depicting the current and future state of EA, EA roadmap, and EA principles (van Gils, 2009) — assists decision making for enterprise design and implementation. While EA diagrams in the form of current or future architecture state describe EA, EA principles prescribe how EA should be realized (van Gils, 2009).

Organizations usually institutionalize EAM by establishing an EA function comprised of various architect roles. Enterprise architects are typically responsible for providing advice to senior management for EA decision making by creating and maintaining a multi-perspective view of EA (Buckl et al., 2011; Steghuis and Propor, 2008; van der Raadt and van Vliet, 2008). Enterprise architects are also responsible for validating conformance of any architectural changes to current and target EA, EA roadmap, and EA principles (Buckl et al., 2011; Radeke and Legner, 2012; van der Raadt and van Vliet, 2008). Van der Raadt and van Vliet (2008) suggest that EA function reaches beyond enterprise architects' team and also includes the stakeholders involved in EA decision making and EA conformance. Therefore, senior management accountable for EA development, and program and project managers affected by EA principles are typical stakeholders of EAM (Boh and Yellin, 2006; van der Raadt and van Vliet, 2008).

Table 2. Selected EA Definitions, Architecture Meanings, and Enterprise Scopes Collected from EA Literature

Author(s)	Definition	Architecture meaning	Enterprise scope
Bernard (2012)	EA is the analysis and documentation of an enterprise in its current and future states from an integrated strategy, business, and technology perspective.	Description of an enterprise	Strategy, business, and technology
Bradley et al. (2012)	EA is the organizing logic for an organization's IT infrastructure and business processes.	Inherent structure of an enterprise	Business processes and IT infrastructure
Doucet et al. (2009)	EA is the architecture that describes a functioning organization. In order for the architecture to allow us to build or change the functioning organizations it would have to include all the key descriptions such as the mission statement, organization design, business plan, job descriptions, process models, workflows, system specifications, information models, etc.	Description of an enterprise	Mission statement, organization design, business plan, job descriptions, process models, workflows, system specifications, information models
Gøtze (2013)	EA is the inherent design and management approach essential for organizational coherence leading to alignment, agility, and assurance.	Inherent structure and management approach	Not specified
Gregor et al. (2007)	EA is a descriptive representation of the basic arrangement and connectivity of parts of an enterprise (such as data, information, systems, technologies, designs, business processes)	Description of an enterprise	Data, information, systems, technologies, designs, business processes
Hoogervorst (2004)	EA is a coherent and consistent set of principles that guide how the enterprise must be designed.	Principles for guiding enterprise design	Not specified
Korhonen (2013)	EA is a holistic, high-level approach to organizational design description and prescription.	Description of an enterprise Principles for guiding enterprise design	Organization
Labusch and Winter (2013)	EA describes the fundamental structures of an enterprise.	Description of an enterprise	Not specified
Lankhorst (2005)	EA is a coherent whole of principles, methods, and models that are used in the design and realization of the enterprise's organizational structure, business processes, information systems, and infrastructure.	Management approach for guiding enterprise design	Organizational structure, business processes, information systems, and infrastructure
Lankhorst (2009)	EA is very much a holistic approach to the design of organizations. All different domains in enterprise design meet: organization, information, systems, products, processes, and applications.	Management approach for guiding enterprise design	Organization, information, systems, products, processes, and applications.

Table 2. Selected EA Definitions, Architecture Meanings, and Enterprise Scopes Collected from EA Literature

Lapkin et al. (2008)	EA is the process of translating business vision and strategy into effective enterprise change by creating, communicating, and improving the key principles and models that describe the enterprise's future state and enable its evolution.	Management approach for guiding enterprise design	Not specified
Radeke (2010)	EA is an organization's basic structure, which might be captured in terms of descriptive models.	Inherent structure of an enterprise	Not specified
Richardson et al. (1990)	EA defines and interrelates data, hardware, software, and communications resources, as well as the supporting organization required to maintain the overall physical structure required by the architecture.	Description of an enterprise	Data, hardware, software, and communication resources
Rood (1994)	EA is a conceptual framework that describes how an enterprise is constructed by defining its primary components and the relationships among these components.	Description of an enterprise	External environment, strategy, corporate culture, people, organizational structure, processes, technology, and information
Ross et al. (2006)	EA is the organizing logic for business processes and IT infrastructure reflecting the integration and standardization requirements of the company's operating model.	Inherent structure of an enterprise	Business processes and IT infrastructure
Tamm et al. (2011)	EA is the definition and representation of a high-level view of an enterprise's business processes and IT systems, their interrelationships, and the extent to which these processes and systems are shared by different parts of the enterprise.	Description of an enterprise	Business processes and IT systems
Zachman (1997)	EA is a set of descriptive representations that are relevant for describing an enterprise.	Description of an enterprise	Not specified

3.2. EA Scope

In addition to confusion regarding the meaning of architecture, disagreement exists on defining the term "enterprise" and thereby EA scope. While some researchers understand enterprise as a synonym for enterprise IT systems, others perceive the term equivalent to organization with all its facets. Comparing the various definitions of EA, as presented in Table 2, we identified three major categories for EA scope. In its simplest form EA scope is limited to technical information components, such as application, data, and technology. This perspective is evident in the definition provided by Richardson (1990), and is also the case in the early EA framework suggested by Zachman (Zachman, 2009a). In other studies, EA scope extends from pure IT components to a multi-perspective concept that also covers business architectural elements. However, we found disagreements among researchers on what business architecture consists of. Some researchers extend EA scope to encompass elements realizing business capabilities, such as business processes, information entities, and organizational structures (e.g., Lankhorst, 2005; Ross et al., 2006). Others extend EA scope even further to incorporate strategic business elements of an organization, such as mission, strategy, and external environment (e.g., Bernard, 2012; Rood, 1994).

In the remainder of the paper, the term "enterprise" refers to an organization or sub-organization of same whose design is coherently and consistently guided by EAM. Therefore, while EA scope covers components whose design could be controlled by enterprise architects, the environment is made up of uncontrollable variables outside enterprise boundaries.

3.3. Archetypes for EAM Applications

We consider coherent and consistent design and evolution of EA to be the major goal of EAM (Aier and Schelp, 2010; Hoogervorst, 2004). However, the impact of EAM on the real-world state of an organization may differ depending on the organizational processes that EAM supports (Zachman, 2009b).

EAM has traditionally been deployed to support understanding, planning, developing, and controlling the IT architecture of organizations (Simon et al., 2014; Wißotzki et al., 2013). EAM goal is then often associated with consistent design of IT architecture in alignment with business strategy and operations (e.g., Buck et al., 2010). Indeed, EAM application for managing business architecture has not received much attention in the literature and in practice, despite the fact that EA originally covers elements such as business goals, strategies, plans, products, and partners (Simon et al., 2014). Consequently, business architectural elements essentially have been reduced to context variables rather than being treated as design variables (Simon et al., 2014). However, several studies indicate a change in the applications of EAM in organizations. Tamm et al. (2011) suggest that EAM is a management discipline that not only enhances business–IT alignment but also organizational alignment. Winter and Schelp (2008) argue that EAM is no longer only an instrument for IT planning, but for corporate planning. EA models are evolving from pure IT architecture models into instruments that by providing an integrated view on organization support business decisions (Wißotzki et al., 2013). Accordingly, the role and responsibilities of enterprise architects are moving away from those of information and IT architects toward guiding the design of business (Wagter et al., 2012). Strano and Rehmani (2007) suggest that enterprise architects should be positioned where they can impact business strategic planning and operations.

We argue that perception of EA scope influences the range of processes that EAM could be incorporated into, and thereby impacts an organization's goal and application of EAM. The previous subsection indicated three views of EA scope among researchers depending on whether aspects of business strategy, business capability, and IT components are within the EA scope. In this section, we use these three classes to develop a taxonomy that classifies various EAM goals and applications. To accomplish that, we map EAM studies to one of the three classes based on perception of EA scope, omitting references to studies that do not provide a clear description of EA scope or do not discuss EAM applications. The next three subsections describe the characteristics of each archetype.

3.3.1. EA Scope: IT Elements

When EA scope is limited to IT elements, EA is the organizing logic for IT infrastructure, data, and applications (Ross, 2003). Boh and Yellin (2006), Richardson et al. (1990), and Ross (2003) are examples of studies with such an IT-centric view toward EA. Boh and Yellin (2006) further extend the scope of IT architecture and suggest that in addition to IT infrastructure, business applications, and data, EA may cover human IT resource such as organizational IT skills, competencies, and knowledge. Similarly, the EA description of Richardson et al. (1990) includes the organization required to maintain the overall physical IT structure in the EA scope.

In this view, the goal of EAM is to ensure coherent and consistent design of IT systems (Hoogervorst and Dietz, 2013). By providing multi-perspective representations of the IT architecture, EAM supports IT asset planning (Rood, 1994). EAM facilitates IT asset portfolio management, consolidation of the IT landscape, and controlling the growth of technical diversity (Boh and Yellin, 2006; Riege and Aier, 2009; Rood, 1994). In addition, EAM supports implementation of IT-related changes (Rood, 1994). The IT-centric EAM facilitates project-level decisions related to data and application design (Boh and Yellin, 2006; Rood, 1994) and further supports IT project management through architecture compliance assessment (Riege and Aier, 2009).

Although the scope of EA in this archetype is limited to IT resources, Boh and Yellin, (2006), Richardson et al. (1990), and Ross (2003) consider EAM to be a discipline that manages not only future technological developments but also achieving business strategic goals. Therefore, the IT-centric EA function is tasked

with guiding decision making related to acquisition, development, and implementation of IT resources in alignment with business direction (Boh and Yellin, 2006). Accordingly, Lapalme (2012) defines the goal of IT-centric EAM as aligning an organization's IT resources to effectively execute business strategy and various operations.

3.3.2. EA Scope: Business Capability and IT Elements

In a more comprehensive perspective toward EA, business processes become a typical component of the enterprise (Lankhorst, 2005; Ross et al., 2006; van der Raadt and van Vliet, 2009; Wißotzki et al., 2013). Lankhorst (2005) and van der Raadt and van Vliet (2009) also include business functions and organizational structure in the EA scope. In other words, the scope of EA in this archetype extends to cover elements realizing business capabilities in addition to IT components. A business capability is an ability of the business to perform a particular kind of work and achieve a specific purpose. Diverse elements play roles in business capability realization, including business processes, information entities, organizational structures, people, and culture (Simon, 2014). Lankhorst (2005), Ross et al. (2006), Tamm et al. (2011), van der Raadt and van Vliet (2009) and Wißotzki et al. (2013) are examples of studies with such more expansive view of EA scope.

In this view, the goal of EAM extends to also ensure coherent and consistent arrangement of business processes, organizational structure, and organizational culture (Hoogervorst and Dietz, 2013). In other words, the EAM goal is to enable organizational alignment (Tamm et al., 2011). Enterprise architects support enacting business strategy and developing the organization's operating platform (Tamm et al., 2011). By providing a holistic view of business capability elements and their relationships, EAM facilitates translating strategic objectives into business capabilities and concrete changes in business processes, governance structure, and IT systems that enable those capabilities and thus organizational objectives (Lankhorst, 2005; Simon et al., 2014; Tamm et al., 2011). EAM as well supports planning business change projects by clarifying their architectural interdependencies and their contribution to strategic objectives (Simon et al., 2014). Furthermore, enterprise architects guide developing the solution architecture of change projects, which provide detailed specifications necessary for operationalizing the business processes and IT systems (Tamm et al., 2011). EAM also supports conformity checks and ensure compliance of changed business capabilities and their core elements (Simon et al., 2014).

Having business capability elements as the design unit enables EAM for guiding integrated design of business capabilities and IT systems (Gregor et al., 2007). This facilitates better management of changes to business and IT, and the right balance between business innovation and IT efficiency (Wißotzki et al., 2013).

3.3.3. EA Scope: Business Strategy, Business Capability, and IT Elements

In its most comprehensive form, EA scope extends to encompass an organization's strategic business elements such as business motivation and business model. Business motivation includes elements such as values, mission, visions, goals, objectives, strategy, drivers, and constraints (Hoogervorst, 2004; Simon et al., 2014). Business model may comprise elements such as value proposition, products, suppliers, customers, resources, and value chain configuration (Hoogervorst, 2004; Simon et al., 2014). Rood (1994), Simon et al. (2014), and Winter and Schelp (2008) are examples of studies that describe such a perception of EA scope.

With such an extended scope, EAM supports strategic development of an organization (Riege and Aier, 2009). In this view, EAM ensures coherent and consistent business model design in terms of products and services, delivery channels, customers, economic model, and relationship with the organization's environment (Hoogervorst and Dietz, 2013). Enterprise architects are formally involved in business strategy formation, where goals and objectives are identified, policies are formulated, and strategies are selected to achieve the overall mission of the organization (Simon et al., 2014). By providing a complete and integrated view of drivers, constraints, and current business capabilities, enterprise architects

facilitate strategic analyses of internal and external business contexts and development of strategic options (Simon et al., 2014). Therefore, Strano and Rehmani (2007) recommend an interface between enterprise architects and external stakeholders to ensure external interests are adequately represented in the EA. In addition, EAM enables assessment of strategic options with model-based impact analysis (Simon et al., 2014). By providing a holistic and integrated view of business strategy and implemented business and IT capabilities, EAM also supports strategy reviews following the completion of strategy implementation projects (Simon et al., 2014).

Having business strategy, business capability, and IT components as design variables, EAM ensures integrated design of the organization as a whole in support of transformative changes (Hoogervorst and Dietz, 2013).

4 Empirical Study

Findings from the literature analysis indicated three perspectives on EA scope among researchers, each associated with different goals and applications of EAM. To examine these findings and further characterize each EA archetype, we conducted a multiple case study of Danish organizations seeking various objectives upon adopting EAM. This section presents a brief description of each case, findings from the cross-case analysis, and a mapping of the studied cases to the proposed taxonomy.

4.1. Case Descriptions

Table 3 presents descriptions of the eight cases. As space limitations do not permit comprehensive descriptions, we present the EA function's position in each organization and its role in governing the design of business and IT architecture. The case description is focused exclusively on enterprise architects' prescriptive role in regulating the design and evolution of EA. Using Radeke and Legner's (2012) description of the strategy management process, we categorize EA function involvement in business and IT architecture design into strategy implementation, strategy planning, and strategy formation. Strategy formation consists of assessing the organization's internal strength and weaknesses and external threats and opportunities, elaborating and evaluating various strategic options, and selecting strategic objectives and initiatives. During the strategy planning stage, the chosen strategic options are translated into tactical plans, and projects realizing the objectives are defined, planned, and aligned. These projects are then executed during strategy implementation (Radeke and Legner, 2012).

Table 3. Case Descriptions

Case	EA function position and makeup	EA function role in IT design	EA function role in business design
Alpha	· EA function positioned as staff function to CIO · EA function comprised of chief architect, application architects for various business domains, information architect, and technology architect · No formal business architect	**Strategy formation** · EA function supports defining IT strategy based on business strategy, IT situation, and emerging IT trends · EA function devises strategic initiatives to improve standardization of IT service portfolio · EA function devises strategic initiatives to enhance IT platform based on emerging IT trends	**Strategy formation** · EA function informally consulted for business strategy development to provide IT perspective
		Strategy planning · EA function supports defining IT target architecture and roadmap for various business domains based on business strategic and IT strategic initiatives · EA function supports project ideation, architecture scenario assessments, and scoping · EA function supports project portfolio management by conducting project architecture feasibility checks and providing input for project prioritization	**Strategy planning** · EA function supports planning business initiatives with IT implications · EA function drives business capability standardization to enable IT standardization, but has no mandate for business design
		Strategy implementation · EA function assesses project architecture conformance to EA principles and target architecture prior to, during, and after project execution	**Strategy implementation** —
Beta	· EA function divided into business and IT architecture teams, located on business and IT sides, respectively · Business architecture team comprised of chief architect and lead business architects for various business areas · IT architecture function includes chief architect, and lead architects for major applications	**Strategy formation** —	**Strategy formation** · Business architects only receive business strategy as input to project solution architecture design
		Strategy planning · Business architects align business requirements across projects to guide design of IT architecture · IT architects support developing target architecture for applications and technology based on required IT services	**Strategy planning** · Business architects not involved in project ideation, scoping, or planning
		Strategy implementation · Business architects design project solution architecture in terms of IT services · Business and IT architects collaborate on IT project architecture compliance reviews · IT architects highly involved in defining project solution architecture in terms of IT systems	**Strategy implementation** · Business architects highly involved in designing project solution architecture in terms of business processes and information · Business architects align data and business process design across projects and assess consistent design of project architecture solutions

Table 3. Case Descriptions

Case	EA function position and makeup	EA function role in IT design	EA function role in business design
Gamma	· EA function located within IT build sub-organization · EA function comprised of lead architect and enterprise architects for various business domains · No formal business architect	**Strategy formation** · No IT strategy	**Strategy formation** —
		Strategy planning · EA function supports planning rationalization of IT service portfolio · EA function not involved in strategic planning of IT architecture based on business strategy as IT lacks an understanding of business strategy · EA function not formally involved in project ideation and reactively assesses technical compliance of IT change requests · EA function cannot support project prioritization due to lack of IT roadmap, but supports project portfolio management by assessing projects compliance with EA principles · EA function designs high-level project architecture	**Strategy planning** —
		Strategy implementation · EA function assesses project architecture conformance to technical standards prior to and during project execution, but there are no well-defined EA principles yet · EA functions highly involved in project solution architecture design	**Strategy implementation** —
Delta	· EA function located within IT plan sub-organization · EA function comprised of chief architect, domain architects for various business domains, and technology architect · No formal business architect	**Strategy formation** · EA function involved in defining IT strategy by assessing strategic options · EA function defines initiatives for reducing IT landscape complexity · EA function accountable to identify potentials of emerging IT trends	**Strategy formation** —
		Strategy planning · EA function supports developing IT target architecture and roadmap based on business and IT strategic initiatives · EA function involved in projects ideation and scoping · EA function consulted for project portfolio management by conducting project architecture feasibility checks and providing input for projects sequencing	**Strategy planning** · EA function involved early in planning business initiatives with IT implications · EA function is influential on the design of business processes
		Strategy implementation · EA function assesses projects architecture conformance to target architecture, roadmap, and EA principles prior to and during project execution	**Strategy implementation** —

Table 3. Case Descriptions

Case	EA function position and makeup	EA function role in IT design	EA function role in business design
Zeta	· EA function located within IT plan sub-organization · EA function comprised of enterprise architects with application and infrastructure skills · No formal business architect	**Strategy formation** · EA function suggests IT strategic initiatives to exploit emerging IT trends	**Strategy formation** —
		Strategy planning · EA function supports developing IT target architecture and roadmap for various business domains based on business initiatives · EA function supports developing technology roadmap and target architecture for enhancing IT platform based on business initiatives and emerging IT trends · EA function involved in project ideation, project scoping, and architecture scenario assessments · EA function designs high-level project architecture	**Strategy planning** · EA function involved early in planning business initiatives with IT implications · EA function influential on the design of business processes
		Strategy implementation · EA function assesses project architecture conformance to roadmap and EA principles prior to and after project execution	**Strategy implementation** —
Theta	· EA function located within IT plan sub-organization · EA function comprised of enterprise architects, each focused on a major application · No formal business architect	**Strategy formation** —	**Strategy formation** —
		Strategy planning · EA function supports refining IT strategy · EA function supports planning IT landscape rationalization · EA function not involved in strategic planning of IT architecture based on business strategy as IT lacks an understanding of corporate operating model and business strategic initiatives · EA function not involved in project ideation and only reactively assesses IT change requests against technical standards · EA function prepares high level project architecture	**Strategy planning** —
		Strategy implementation · EA function assesses project architecture compliance prior to and during project execution, though there are no clear EA principles yet · EA functions highly involved in project solution architecture design	**Strategy implementation** —

Table 3. Case Descriptions

Case	EA function position and makeup	EA function role in IT design	EA function role in business design
Kappa	· EA function divided into business and IT architecture teams located on business and IT sides, respectively · Business architecture team comprised of business architects for various business domains · IT architecture team comprised of chief architect, information architects, and technology architect	**Strategy formation** · IT architects suggest initiatives to enhance IT landscape based on emerging IT trends and IT architecture complexity	**Strategy formation** · Business architects provide feedback on business strategy based on business strategy impact analysis · Business architects informally suggest strategic initiatives to reduce complexity of organizational structure and business processes and their improvement based on best practices and standards
		Strategy planning · IT architects support IT delivery managers with developing delivery area target architecture and roadmap based on business strategy and emerging IT trends · IT architects support defining and scoping business-driven IT projects · IT architects support IT delivery area managers in defining IT projects enhancing IT platform · IT architects consulted for project portfolio management by conducting project architecture feasibility checks and providing input for project prioritization	**Strategy planning** · Business architects support operationalizing business strategy into target architecture for business processes, information, and organizational governance · Business and IT architects drive business process standardization and integration discussions · Business architects support defining and scoping business projects based on business strategy and roadmap · Business architects design high-level business projects architecture
		Strategy implementation · IT architects assesses project architecture conformance to EA principles and current and target IT architectures	**Strategy implementation** · Business architects guide the design of business projects solution architecture and ensure their consistent design
Sigma	· EA function divided into business and IT architecture teams located as staff function to CEO and within IT organization , respectively	**Strategy formation** · IT architects formulate initiatives for rationalizing IT service portfolio	**Strategy formation** · Business architects support business model development by providing knowledge of external environment and internal resources and offering strategic options
		Strategy planning · IT architects plan IT landscape based on business strategy · IT architects involved in IT project definition	**Strategy planning** · Business architects support redefining business capability elements based on new business model · Business architects involved in business project ideation and project definition, analysis, and high-level project architecture design
		Strategy implementation · IT architects review project architecture compliance	**Strategy implementation** —

4.2. Cross-Case Analysis

We found the EA function in all eight cases to be responsible for ensuring coordinated design and evolution of EA; however, we noticed significant differences in scope of activities and support for various strategic change processes. Using two factors, we divided the cases into five groups. The first factor that distinguished the cases from one another was EA scope, indicating those variables for which enterprise architects had design authority. In line with our suggested taxonomy, we identified the breadth of EA function responsibilities limited to three EA scopes. In its simplest form, EA scope covered IT components; in an extended form, EA scope also comprised business processes, information assets, and occasionally organizational governance structure and processes; and in its most comprehensive form, EA scope also included the business model and business strategy. After categorizing cases based on EA scope, we conducted a pair-wise comparison between the cases in each group. Although we identified several factors that differentiated the cases from each other, we recognized one highly relevant factor for mapping the cases against the proposed taxonomy. This factor indicated EA function influence on the design of architectural elements external to its associated EA scope.

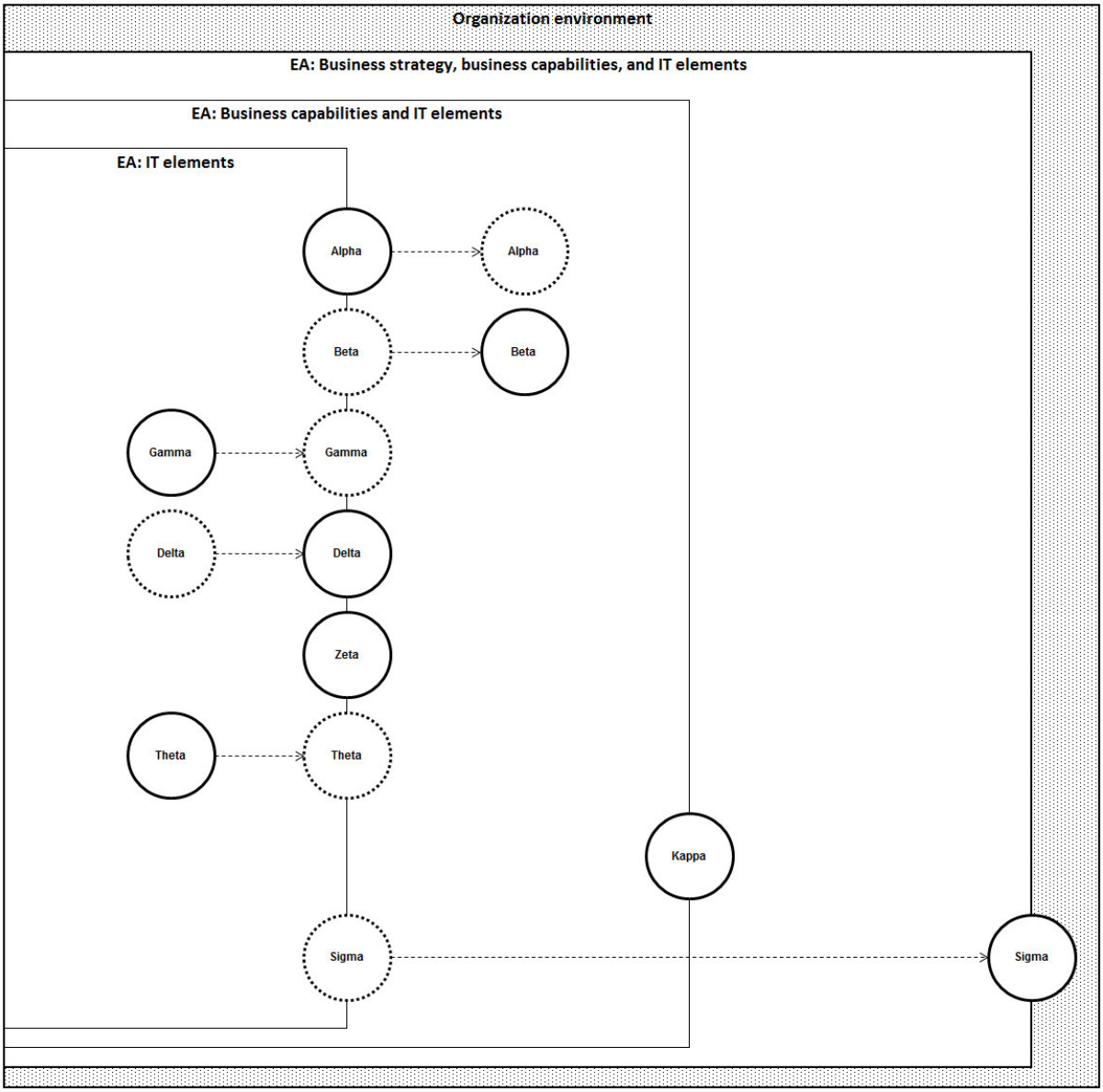

Figure 3. Mapping of Eight Cases based on EA Scope

We used the two differentiating factors to map the cases based on their EA scope as presented in Figure 3. The solid circles denote the current EA scope of the cases and the dotted circles represent their previous or intended scope. The arrows indicate the change in EA scope. The next subsections describe the five identified groups in terms of EA function characteristics and EAM applications by merging the convergent data of associated cases. We also discuss our arguments for the mapping shown in Figure 3. We close this section by presenting the main findings from the cross-case analysis.

4.2.1. EA Scope: IT Elements

EAM in Alpha, Gamma, Delta, Zeta, and Theta is IT-centric. The perspective on EA in these cases is consistent with Ross's (2003) view of IT architecture, considering it as the organizing logic for application, data, and infrastructure technologies. Therefore, mapping them to the proposed taxonomy, we place them in the first category as illustrated in Figure 3. In all these cases, the EA function is perceived as an IT function and its responsibilities are constrained by IT function boundaries. The EA function is responsible for guiding the design and evolution of IT architecture and managing its complexity. The EA function is comprised of enterprise IT architects with skill sets typically pertinent to application, technology, and data. There is no enterprise business architect in charge of business architecture design, implying that business architectural components are only context variables for which the EA function has no design authority. Yet, in all these cases, enterprise IT architects emphasize the need for business understanding to place technology design in the context of business objectives and requirements. However, we identified differences among these cases with respect to enterprise IT architects' knowledge of and influence on business context and requirements, which impacted their effectiveness in managing IT architecture. The next subsections describe characteristics of the two groups.

EA function: Receiver of IT change requests

The approach toward EAM in Gamma, Theta, and formerly Delta resembles the standardized technology stage of Ross's (2003) EA maturity model, where the goal is to rationalize IT. In these cases, we did not find the EA function involved in strategy formation, simply because there was no significant IT strategy. We found the EA function mainly responsible for supporting operationalizing and planning of one major IT objective: reducing IT landscape complexity by eliminating duplicated and less efficient services. Long-term IT strategy planning based on business strategy is not present either. Enterprise IT architects are involved late in the planning process for IT-related business initiatives and only receive quite matured IT change requests to assess their technology choices. The EA function then supports IT project solution design and implementation by preparing high-level project architectures and assessing project solution architecture compliance with existing architecture and technical standards. As predicted by Heiß (2015), lack of a holistic plan for IT architecture evolution has reduced the role of enterprise IT architects to providing expertise in developing project solution architecture and managing technology standards. Late involvement of enterprise IT architects in planning IT-related business initiatives has also negatively impacted their influence on business decisions with IT implications and therefore managing IT architecture evolution.

As also suggested by Henderson and Venkatraman (1993) and Teo and King (1997), enterprise IT architects in these cases associate their late engagement in planning business initiatives to the perception of IT in the organization. In both organizations, IT is perceived only as a service provider responsible for delivering IT solutions. Completely aware of their low EAM maturity, these EA functions are demanding earlier involvement in business strategic initiatives to proactively plan and better manage changes to IT architecture. Delta has already succeeded in this transition and as a result, the EA function has been moved to the IT plan sub-organization from its prior position within IT build.

EA function: Influences business strategy formation and planning

In Alpha, Delta, and Zeta, the EA function is either located in the IT plan sub-organization or as a staff function to the CIO. Like Gamma and Theta, enterprise IT architects are responsible for architectural

compliance assessment of IT projects prior to and during implementation. Furthermore, we found them relatively more engaged in IT strategy formation by facilitating situation analysis and developing and analyzing strategic initiatives. Enterprise architects also actively formulate strategic initiatives to reduce complexity of the IT landscape and improve its performance in line with emerging IT trends. Having a holistic understanding of IT architectural components and their relationships, they also support translating IT strategic initiatives to tactical plans.

In addition to planning IT strategic initiatives, enterprise IT architects are highly involved in strategic planning of IT based on business strategy. The EA function facilitates or even holds responsibility for operationalizing business strategic initiatives into IT target architecture, roadmaps, and projects. Indeed, business strategic planning and IT strategic planning processes are integrated, which enables enterprise IT architects to influence business decisions with IT implications. In this way, enterprise IT architects are not merely the recipients of IT change requests, but are involved early in bringing IT project ideas to maturity by clarifying relations between business and IT architectural elements. This not only enables enterprise IT architects to better manage the complexity of IT architecture, but also allows them to consult for new and improved use of IT services for realizing business objectives and enhancing business capabilities. We found enterprise IT architects in Delta and Zeta especially influential in the design of business processes and information assets. Enterprise IT architects in Alpha are even driving business capability standardization to enable standardization of the IT portfolio. In addition to enterprise IT architects' influence on the business strategy planning process, we found that chief enterprise IT architect in Alpha consulted for business strategy formation to clarify IT implications of business strategic options. Therefore, in Figure 3, we decided to locate Alpha, Delta, and Zeta on the edge of the box to indicate their influence on business components external to IT boundaries.

Enterprise IT architects in these three cases suggest that their organization's view of IT as a business enabler has allowed their early involvement in planning business initiatives (Teo and King, 1997). Enterprise IT architects' influence on business architectural elements supports the view that suggests making technology work requires a wider perspective than technology only, whereby contextual aspects are included in the design perspective to optimally match context and technology (Hoogervorst, 2004; Ross, 2003). Yet, constrained by IT function boundaries, enterprise IT architects in none of these cases have control over the design of business architecture. Uncoordinated business development efforts across corporate business units still negatively affect the management of IT architecture complexity. Alpha suggests that extending the EA function to the business side will empower architects to formally govern integrated design of business and IT.

4.2.2. EA Scope: Business Capability and IT Elements

In Beta and Kappa, we found that the EA function was responsible for business architecture management activities in addition to guiding IT architecture design. The EA function not only has authority over the design of IT elements, but also some of the elements realizing business capabilities. The most noticeable difference between these cases and IT-centric ones is the presence of enterprise business architects. The responsibility for EAM is divided between business and IT architecture teams situated within the business and IT sides of the organization. While enterprise IT architects focus on managing the evolution of IT architecture, enterprise business architects ensure coordinated design of business processes, information assets, and organizational governance structure. Therefore, we locate these cases in the second category where EA scope extends to cover business capability elements. Responsible for guiding the design of business capability elements, enterprise business architects in both organizations highly emphasize the need for understanding business strategy. However, we observed differences between Beta and Kappa with respect to the extent of their influence on business strategy. The next two subsections describe EAM activities in each case.

EA function: Receiver of business projects

In Beta, the business architecture team is highly involved in business project solution design to specify business processes, information assets, and IT services based on business requirements. Enterprise business architects also coordinate the design of projects solution architecture and ensure their consistency. Consistent design of business processes, information assets, and IT services across various projects in turn better enables management of IT architecture complexity. Indeed, EA function was extended from IT to the business side to facilitate better understanding of business requirements for defining IT services. The relocation then empowered enterprise business architects to also govern the design of business processes and information assets.

While highly engaged in business strategy implementation, enterprise business architects are not involved in long-term visioning of business architecture and defining and planning business projects. They have no influence on the formation or planning of business strategy and only receive it as a taken-for-granted input directing the design of business processes and information assets.

EA function: Influences business strategy formation

Like Beta, enterprise business architects in Kappa guide the design of business project solution architecture in support of business strategy implementation and their conformance to business and architectural principles. However, their responsibilities also extend to cover planning of business strategy. Having a holistic understanding of business architectural elements and their relationship, enterprise business architects in Kappa facilitate operationalization of business strategic initiatives into target architecture for information assets, organizational governance structure, and business processes. They also support defining the roadmap and required projects for realizing the target architecture. Horizontal connections between enterprise business and IT architects enable integrated planning of business and IT capabilities. As an example, enterprise business and IT architects in Kappa are jointly driving standardization and integration of business processes, data assets, and IT systems across corporate business units. Therefore, the concept behind EAM in Kappa is similar to the Versteeg and Bouwman (2006) perspective, in which business strategy and business model are inputs for development of business processes, information assets, organizational governance, and IT components.

Although not formally invited to strategy meetings, enterprise business architects in Kappa see themselves influencing the business strategy formation process. Tightly engaged with senior business managers, they provide feedback on business strategy based on its implications for business processes and organizational governance structure. They also provide input to business strategy formation based on their knowledge of performance of business architectural elements in realizing business capabilities. Responsible for managing complexity of corporate business processes and the governance model and aware of industry best practices, enterprise business architects also suggest business redesign initiatives. Therefore, in Figure 3 we chose to locate Kappa on the edge of the box to indicate EA function influence on business strategy.

4.2.3. EA Scope: Business Model, Business Capability, and IT Elements

In Sigma we observed the most advanced application of EAM. The EA function not only governs the design of business capability and IT components, but is also formally involved in developing the business model. Therefore, having business strategic elements as design variables for EAM activities, Sigma represents the most comprehensive EA scope where the EA function covers the design of all organizational facets. While the EAM goal in Sigma was previously limited to governing the evolution of IT architecture, market volatility necessitated strategic agility and encouraged application of EAM for developing business strategies. Enterprise business architects highly emphasize understanding the organization's external environment to guide its innovative development. The next subsection describes EAM activities in Sigma.

EA function: Supports defining business strategy

In Sigma, the EA function is divided into the business architecture team positioned as a staff function to the CEO and the IT architecture team located in the IT organization. Constantly specifying and questioning the organizational situation in relation to its internal resources and external environment, enterprise business architects are involved in business strategy formation. Enterprise business architects facilitate redefinition of the business model in alignment with customer requirements, competitor behavior, emerging technological trends, and business and IT capabilities. Enterprise business architects also support business strategy planning by clarifying and communicating implications of a new business model for business and IT execution elements such as business processes, managerial practices, organizational governance model, and IT resources. They also take part in defining and scoping projects realizing the business strategy. In this way, enterprise business architects ensure coherency between business strategy formation and planning processes.

Possessing an understanding of market dynamics, enterprise business architects not only support adjusting the business model to market requirements, but also actively devise strategic initiatives to foster innovation by influencing the organization ecosystem. Drawing on their comprehensive understanding of corporate customer requirements, competitor offerings, and emerging technologies, business architects have suggested several unconventional offerings that were disruptive to Sigma's competitors. Therefore, in Figure 3, we chose to place Sigma on the edge of the box to indicate its influence on the organization's environment.

4.3. Summary of Findings

The eight case studies empirically supported the taxonomy derived from our literature synthesis in terms of EA scope. The study by Radeke and Legner (2012) also provided grounding for better articulating EAM applications. To ensure coherent and consistent design of an enterprise, and depending on enterprise boundaries, EAM may be used to support processes for IT strategy formation, planning, and implementation; business strategy planning and implementation; business strategy formation; or a combination of these.

While EA scope defines variables controllable by enterprise architects, the empirical findings indicate the importance of understanding the external environment for managing EA. This observation is in line with Rood (1994), which suggests that EA must be developed with environmental forces in mind. We can explain this finding by taking a systems view toward an enterprise. Systems theory suggests that as an open system is not independent from its ecosystem, controlling and understanding its behavior not only require understanding its operations, but understanding its broader surrounding context (Gharajedaghi, 2011). Gharajedaghi (2011) further explains that as knowledge about the environment increases, so does the ability to convert uncontrollable variables to those that can be influenced. This is consistent with our findings from more mature cases where enterprise architects not only understood the environment in order to plan EA evolution accordingly, but also actively attempted to influence it to better manage EA evolution. This suggests that the environment is not entirely a context variable for EAM activities. Enterprise architects manage the evolution of EA not only in sequential alignment with the environment but also by influencing—not controlling—design of elements external to EA scope. This finding is also consistent with Hoogervorst (2004), suggesting the need for mutual consistency between the main design domains of an organization. In the next section, we use this finding to revise the taxonomy.

5 EA Taxonomy

Combining findings from the literature synthesis and case studies, Table 4 presents our taxonomy of EAM goals and applications according to three perspectives on EA scope among researchers and practitioners.

The archetypes are labeled according to the organizational process or function EAM may support. Each archetype includes and transcends EA scopes and EAM goals and applications in previous archetypes.

Table 4. Taxonomy of EAM Applications based on EA Scope

	IT management	Business capability management	Business strategy management
EA scope	IT elements	Business capability elements	Business strategy elements
EAM goal	Coherent and consistent design and evolution of IT elements in mutual alignment with business strategy and capabilities	Coherent and consistent design and evolution of business capabilities realization elements in mutual alignment with business strategy	Coherent and consistent design and evolution of business model in mutual alignment with market environment
EAM application	Complements IT strategy formation, planning, and implementation Influences business strategy formation and planning	Complements business strategy planning and implementation Influences business strategy formation	Complements business strategy formation

In its simplest form, EAM supports an organization's IT management. When EA scope is limited to IT elements, organizations adopt EAM to ensure coherent and consistent design of IT systems (Hoogervorst and Dietz, 2013). Therefore, enterprise architects are involved in processes for IT strategy formation, planning, and implementation to ensure coordinated acquisition, development, and implementation of IT systems. When it comes to IT strategy formation and planning processes, enterprise IT architects facilitate IT situation analysis, developing and analyzing strategic scenarios, operationalization of business and IT strategic initiatives into IT target architecture and roadmap, and IT project definition and planning. Having a holistic understanding of IT architecture, enterprise IT architects may also devise architecture initiatives to reduce complexity and exploit emerging IT trends. Regarding IT strategy implementation, enterprise IT architects complement project review processes by assessing project architectural conformance to EA principles and existing and target IT architectures. As enterprise IT architects have no formal responsibility for governing the design of business architecture, the EA function is located within the IT organization and comprises architect roles covering application, data, and technology components of EA (Graves, 2008). While business strategic initiatives and required capabilities are inputs for IT architecture design, architects may still influence business architectural elements to better manage IT architecture complexity and enable IT-driven business innovations.

In a more comprehensive perspective toward EA, EAM supports business capability management. When EA scope extends to cover business capability elements, the EAM goal is to ensure coherent and consistent design of business capability elements in integration with IT components (Hoogervorst and Dietz, 2013). The EA function formally supports business strategy planning process by facilitating operationalization of business strategy into target architecture for business capability elements, and definition and planning of projects based on their contribution to strategic objectives and architectural constraints and interdependencies. The EA function is also responsible for assessment of project architecture consistency in design and conformance to EA principles prior to, during, and after project implementation. Enterprise business architects are now part of an EA function that is spread between business and IT organizations. Situating enterprise business architects on the business side enables their better understanding of the business context as well as their authority for guiding business architecture design. Business strategy and strategic initiatives are inputs for design activities. However, enterprise business architects may still influence business strategy by explicating its impact on business capability elements (Wolfenden and Welch, 2000), providing input about performance of business capability elements in meeting business objectives, and suggesting initiatives to improve business architecture performance.

In its most comprehensive form, EAM facilitates business strategy management. When EA scope covers strategic components of business, EAM ensures coherent business model design in integration with business capability and IT elements (Hoogervorst and Dietz, 2013). The EA function supports formation of the business strategy and business model — as the conceptual blueprint of business strategy — in alignment with external environment and internal resources (Simon et al., 2014). EAM complements this process by facilitating situational analysis of the organization in relation to its environment, and development and assessment of strategic options. The EA function also formally supports devising initiatives to reduce the complexity of architecture and improving its performance in line with industry standards. With an understanding of market dynamics, enterprise business architects also enable innovation by facilitating development of strategic scenarios that bring the organization's ecosystem in line with strategic goals (Lapalme, 2012). To enable enterprise business architects' participation in business strategy formation, they are situated close to executive managers (Graves, 2008).

6 Discussion

Findings from the literature review and case studies show three perspectives on EA scope among researchers and practitioners. This study used the three identified views of EA scope to classify EAM applications in organizations. The taxonomy suggests that an EA scope limited to IT components restricts EAM applications to supporting IT strategy formation, planning and implementation; an extension of EA scope to cover business capability elements enables EAM to also support business strategy planning and implementation; and extending EA scope even further to cover business strategic elements turns EAM into a systematic approach supporting all of the above processes and business strategy formation. In other words, depending on EA scope, an organization may use EAM to support IT management, business capability management, or business strategy management. More importantly, the findings suggest that enterprise architects understand and influence processes external to the EA scope to better manage EA design and evolution.

Besides eliminating confusion about the EAM applications, the taxonomy assists managers to deliberately decide about adoption of the EAM concept for various strategic management processes, scope of enterprise architects' responsibilities, and integration of the EA function into organizational governance. The findings as well have three theoretical implications. First, in line with previous studies on integrating systems theory and enterprise architecture thinking (e.g., Gharajedaghi, 2011), our findings reinforce the importance of systems thinking, especially adoption of the open systems principle, for managing EA design and evolution. While EA scope defines architectural elements whose design could be controlled by enterprise architects, findings from the case studies suggest that the environment external to EA scope is not entirely a context variable. To effectively manage EA evolution, enterprise architects need to understand the enterprise environment, which potentially may allow them to influence variables external to EA scope. The systems view of the enterprise challenges the strictly hierarchical approach for EA development that starts with strategic positioning, and then derives appropriate organizational processes and structures on the strategy basis, and then finally specifies IT systems (e.g., Winter et al., 2007). As indicated in the case studies and suggested by Hoogervorst and Dietz (2013) and Korhonen (2013), a strictly hierarchical approach fails to consider the impact of lower-level dimensions on higher-level decisions.

Second, the findings may also suggest a trend for extending EAM applications in organizations. In other words, organizations adopt EAM to support various strategy management processes, and as the EAM concept becomes more mature, its applications are extended to a wider range of processes. This proposition is consistent with the US Government General Accountability Office (2010) framework for assessing and improving EAM in which EAM use is one dimension for distinguishing among stages of EAM capability maturity. However, as illustrated in Figure 3, not all studied organizations have extended their EAM application in the same manner. This finding may indicate the influence of contingency factors on the evolution path and reinforce situational EAM studies suggesting that the EAM development path is

organization specific (e.g., van der Raadt and van Vliet, 2009). We noticed industrial sector and business governance model differences between IT-centric EAM cases and those that adopt EAM for business management. In all three cases where EAM supports business strategic management processes, we found a relatively more centralized approach toward business governance. In addition, two out of these three cases belong to the financial sector. While centralized business governance may have facilitated a coordinated approach for governing business architecture development, the industrial sector may have necessitated strategic agility and therefore the need for a systematic approach for business development in these organizations. This observation is consistent with Haki et al.'s (2012) findings from four case studies in which they identify the organizational structure and industry type influential in EAM adoption.

Third, our findings also challenge the studies that associate enterprise architects solely with an IT identity. Gartner (Blosch and Burton, 2014) argues that as growth in the digital economy is increasing the importance of IT in organizations, enterprise architects are demanding involvement in business development activities to enable exploitation of emerging IT trends. While Gartner acknowledges the changing role of enterprise architects from supporting IT management toward business strategy management, enterprise architects' contribution to business development remains limited in that they provide only an IT perspective. However, our findings suggest that enterprise architect involvement in business strategy management is not limited to leveraging digital economy opportunities. By providing a comprehensive view of the organization in its environment, enterprise architects support developing business strategy in alignment with a broader range of competitive and market forces.

While only a few studies suggest a classification for EAM applications, the taxonomy proposed in this paper is different from the earlier ones. Ross et al. (2006) suggest a maturity model for EA where EAM governs the design of an organization's business processes, data assets, and IT systems. However, considering business strategy as a taken-for-granted input for design activities, their model suggests EAM as a tool supporting execution of business strategy and overlooks the broader application of EAM for business strategy formation. Lapalme (2012) also introduces three schools of thought on EAM; however, the proposed taxonomy is not grounded on empirical evidence. In addition, Lapalme's taxonomy simply divides EA into IT and business architectures where business architecture comprises all facets of an organization. However, building upon an extensive literature review and real-world evidence, our study distinguishes between two different views of business architecture. Lapalme (2012) also associates system-in-environment thinking with the most mature application of EAM in governing design and evolution of an entire organization, whereas our findings suggest that effective management of EA evolution requires system-in-environment thinking irrespective of EA scope.

7 Conclusion

A growing body of academic and practitioner literature has researched EA and EAM. We identified widely different perspectives on the term EA, which in turn had given rise to different views of EAM goals and applications in organizations. In this study we clarify the EA terminology; and drawing on findings from a literature synthesis and case studies, we propose a taxonomy that classifies EAM applications based on three recognized perspectives of EA scope. The taxonomy suggests that EAM can facilitate IT strategy formation, planning, and implementation; business strategy planning and implementation; and business strategy formation, depending on whether EA scope covers IT, business capability, or business strategic elements of an organization. The empirical findings further underline the importance of systems thinking for managing the evolution of EA as an open system and suggest that enterprise architects influence strategic management processes beyond their EA scope.

While our study provides valuable insights into diverse applications of EAM in organizations, there are certain limitations. The theoretical and empirical findings support the three proposed archetypes of EAM applications, but more in-depth studies are necessary to refine our findings and further characterize the three archetypes in terms of EA function makeup, its integration into organizational governance, and professional and personal competencies of enterprise architects. Eventually these characteristics can be

used to enhance and extend the maturity models for assessing EAM capability. Next, our empirical studies demonstrated examples of EAM methods used to support various stages of the strategy management process; however, further research is needed to provide a more comprehensive understanding of these methods. Finally, while our case studies indicate that organizations seek different goals and applications by adopting EAM, more detailed studies are needed to investigate contingency factors that influence organizations' use of EAM. The current study also indicates a trend for advancing EAM application in organizations and various pathways for its evolution. This will inspire further studies for exploring contingency factors that encourage organizations to extend EAM application and for investigating factors that influence the path of evolution.

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Appendix A: List of Coded Papers

Author	Title
Abraham et al. (2012)	Two speeds of EAM—A dynamic capabilities perspective
Abraham et al. (2013)	Understanding coordination support of enterprise architecture management–Empirical analysis and implications for practice
Aier et al. (2008)	Classification of enterprise architecture scenarios
Aier et al. (2009)	Enterprise architecture design as an engineering discipline
Aier & Schelp (2010)	A reassessment of enterprise architecture implementation
Aiet et al. (2011)	Understanding enterprise architecture management design - An empirical analysis
Bean (2010)	Re-thinking enterprise architecture using systems and complexity approaches
Bernard (2012)	An introduction to enterprise architecture
Boh & Yellin (2006)	Using enterprise architecture standards in managing information technology
Bradley et al. (2012)	Enterprise architecture, IT effectiveness and the mediating role of IT alignment in US hospitals
Bricknall et al. (2006)	Enterprise architecture: Critical factors affecting modelling and management
Buckl et al. (2009)	Enterprise architecture management patterns for enterprise architecture visioning
Buckl et al. (2009)	A viable system perspective on enterprise architecture management
Buckl et al. (2010)	A situated approach to enterprise architecture management
Buckl et al. (2010)	A design theory nexus for situational enterprise architecture management
Buckl et al. (2010)	Future research topics in enterprise architecture management – A knowledge management perspective
Buckl et al. (2010)	Towards a method framework for enterprise architecture management–a literature analysis from a viable system perspective
Buckl et al. (2011)	A method base for enterprise architecture management
Clerc et al. (2007)	The architect's mindset
Cumps et al. (2013)	Towards enterprise architecture infused organisations
Dietz & Hoogervorst (2008)	Enterprise ontology in enterprise engineering
Doucet et al. (2009)	Introduction to coherency management: The transformation of enterprise architecture
Espinosa & Boh (2009)	Coordination and governance in geographically distributed enterprise architecting: An empirical research design
Graves (2008)	Real enterprise-architecture - Beyond IT to the whole enterprise
Greefhorst & Proper (2011)	Architecture principles: the cornerstones of enterprise architecture
Gregor et al. (2007)	Enterprise architectures: enablers of business strategy and IS/IT alignment in government
Gøtze (2013)	The changing role of the enterprise architect
Haki et al. (2012)	Beyond EA frameworks: Towards an understanding of the adoption of enterprise architecture management
Hafner & Winter (2008)	Processes for enterprise application architecture management
Hauder et al. (2013)	An examination of organizational factors influencing enterprise architecture management challenges
Heiß (2015)	From business motivation to business model and beyond: A customer value-driven approach
Hoogervorst (2004)	Enterprise architecture: Enabling integration, agility and change
Hoogervorst & Dietz (2013)	Enterprise architecture in enterprise engineering
Kang et al. (2010)	Alignment of business enterprise architectures using fact-based ontologies
Kappelman et al. (2008)	Enterprise architecture: Charting the territory for academic research
Kluge et al. (2006)	How to realise corporate value from enterprise architecture
Korhonen (2013)	Enterprise architecture and EA governance: A stratified systems approach
Labusch & Winter (2013)	Towards a conceptualization of architectural support for enterprise transformation
Lagerström et al. (2011)	Enterprise architecture management's impact on information technology success
Lapalme (2012)	Three schools of thought on enterprise architecture
Lankhorst (2005)	Enterprise architecture at work: modelling, communication and analysis
Lankhorst et al. (2009)	Beyond enterprise architecture
Lapkin et al. (2008)	Gartner clarifies the definition of the term enterprise architecture
Lucke et al. (2010)	Critical issues in enterprise architecting–a literature review
Lux et al. (2010)	Understanding the performance impact of enterprise architecture management
Lux and Ahlemann (2012)	Embedding EAM into the project life cycle
Löhe & Legner (2012)	From enterprise modeling to architecture-driven IT management - A design theory
Löhe & Legner (2014)	Overcoming implementation challenges in enterprise architecture management: A design theory for architecture-driven IT management
Mayara et al. (2012)	On the role of information technology systems architects

Appendix A: List of Coded Papers (Continued)

Author	Title
Radeke (2010)	Awaiting explanation in the field of enterprise architecture management
Radeke (2011)	Toward understanding enterprise architecture management's role in strategic change: Antecedents, processes, outcomes
Radeke and Legner (2012)	Embedding EAM into strategic planning
Richardson et al. (1990)	A principles-based enterprise architecture: lessons from Texaco and Star Enterprise
Riege & Aier (2009)	A contingency approach to enterprise architecture method engineering
Rood (1994)	Enterprise architecture: Definition, content, and utility
Ross (2003)	Creating a strategic IT architecture competency: Learning in stages
Ross et al. (2006)	Enterprise architecture as strategy: creating a foundation for business execution
Sasa & Krisper (2011)	Enterprise architecture patterns for business process support analysis
Sauer & Willcocks (2002)	The evolution of the organizational architect
Simon et al. (2014)	Enterprise architecture management and its role in corporate strategic management
Steghuis & Proper (2008)	Competencies and responsibilities of enterprise architects
Stelzer (2010)	Enterprise architecture principles: literature review and research directions
Strano & Rehmani (2007)	The role of the enterprise architect
Tamm et al. (2011)	How does enterprise architecture add value to organisations
Turner et al. (2010)	Architecting the firm – Coherency and consistency in managing the enterprise
Van der Raadt et al. (2005)	Alignment and maturity are siblings in architecture assessment
Van der Raadt et al. (2008)	Stakeholder perception of enterprise architecture
Van der Raadt & van Vliet (2008)	Designing the enterprise architecture function
Van der Raadt & van Vliet (2009)	Assessing the efficiency of the enterprise architecture function
Van der Raadt et al. (2010)	The relation between EA effectiveness and stakeholder satisfaction
Van Gils (2009)	Strategy and architecture–reconciling worldviews
Van Roosmalen & Hoppenbrouwers (2008)	Supporting corporate governance with enterprise architecture and business rule management: A synthesis of stability and agility
Veasey (2001)	Use of enterprise architectures in managing strategic change
Versteeg & Bouwman (2006)	Business architecture: A new paradigm to relate business strategy to ICT
Wagter et al. (2012)	Enterprise architecture: A strategic specialism
Walker (2007)	A day in the life of an enterprise architect
Widjaja & Gregory (2012)	Design principles for heterogeneity decisions in enterprise architecture management
Winter & Schelp (2008)	Enterprise architecture governance: The need for a business-to-IT approach
Winter et al. (2007)	Analysis and application scenarios of enterprise architecture: An exploratory study
Winter et al. (2010)	Investigating the state-of-the-art in enterprise architecture management methods in literature and practice
Wittenburg et al. (2007)	Building an integrated IT governance platform at the BMW Group
Wißotzki et al. (2013)	Development of an enterprise architecture management capability catalog
Wolfenden & Welch (2000)	Business architecture: a holistic approach to defining the organization necessary to deliver a strategy
Zachman (1997)	Enterprise architecture: the issue of the century
Zachman (2009)	The Zachman framework evolution

Appendix B: Codebook Used for Literature Analysis

Code	Definition	Inclusion/exclusion criteria	Example
EA definition	What EA is. EA might be defined as inherent enterprise structure, an enterprise description, set of principles prescribing EA design, or a management methodology or process.	Only code excerpts that explicitly define EA. Only include original definitions. Disregard implicit descriptions and assumptions.	EA is the fundamental organization of a system [the organization] embodied in its components, their relationships to each other, and to the environment, and the principles guiding its design and evolution.
EA scope	Elements that EA consists of, or EA describes, or EA manages their design and evolution.	Only code excerpts that explicitly enumerate what EA consists of or what EA covers.	EA involves elements such as business goals, strategies, plans, products, and partners.
EAM definition and goals	What EAM is or how EAM manages EA. Also the goals and objectives for adopting the EAM capability in organizations.	Only code excerpts that explicitly define EAM. As EAM definition typically includes the purpose of deploying EAM, this code also covers excerpts explaining EAM goals. Do not code excerpts that define EAM application and use cases. EAM goal refers to the ultimate objective of adopting EAM not the organizational processes or functions it supports.	We take enterprise architecture management (EAM) to mean the general process of managing, maintaining, and developing EA in a holistic and purposeful manner. EA management captures all those processes, methods, tools, and responsibilities needed to build a holistic and integrated view of the enterprise and allow for a continually aligned steering of business and IT.
EAM application	Organizational processes and functions that EAM facilitates and supports to realize EAM goals. EAM may facilitate IT and business processes or functions.	The excerpt should refer to organizational processes or functions that EAM supports. The EA function does not own the process but has a supportive role for its execution. Some papers explicitly or implicitly define EA as a management methodology, therefore, by assuming that EA is the inherent structure of an enterprise, also include those excerpts that refer to EAM application as EA application.	EA can be employed in various scenarios. Most often, it is associated with IT cost management, project portfolio planning, compliance management, project initialization, and post-merger integration.
EA function tasks	Tasks and deliverables of the EA function through which EAM achieves its goals and applications.	Do not code excerpts that describe EAM applications, use cases, or processes that EAM supports. Code excerpts that refer to the activities and deliverables of EA function or methods and processes within the EAM capability that are used to provide those use cases. Also include statements that refer to how EAM enables its goals or facilitates its various applications.	Most obvious, the holistic perspective taken requires a large amount on information about the architecture elements as well as their interdependencies. Collecting the relevant information, but also keeping the information up-to-date, communicating it to the interested parties in the organization, or performing analyses are tasks, whose complexity grows with the rising amount of information to handle.

Appendix B: Codebook Used for Literature Analysis (Continued)

Code	Definition	Inclusion/exclusion criteria	Example
EA function structure	Roles that constitute the EA function or are involved in the management of EA. EA function position in the organization.	Some studies may also discuss stakeholders impacted by EAM activities. This code also covers those excerpts but make a distinction between roles directly responsible for EAM tasks and stakeholders impacted by EAM. The statement may also refer to how to incorporate EAM function into the organizational governance structure.	The EA delivery function is the team of architects responsible for creating and maintaining EA products (architectures and EA policies). In our view, the EA function reaches beyond the EA delivery function, and also includes the bodies, roles, structures and processes involved with ratifying, enforcing and conforming to the EA products.
EAM capability adaptation	Factors that influence establishing EAM capability in organizations and reasons for why organizations may adopt EAM in different ways.	Do not code excerpts that describe elements determining the maturity of EAM capability. Only code excerpts that discuss contingency factors that make organizations adopt EAM differently.	The goals of EA have to be substantiated during the establishment of an appropriate management function in order to identify the elements of the EA relevant for the initiative. From the contextual factors the size of the enterprise and the resulting number and size of the architecture models is the most obvious. Bigger companies require more and larger models to be described, which translates in larger and more complex EA activities.
EAM capability maturity	Different modes and classes of EAM that represent various maturity levels of the EAM capability in organizations.	Code excerpts from papers that have an evolutionary perspective of EAM adoption and offer a maturity model for EAM. Pay attention to the dimensions that differentiate various EAM maturity levels.	We translated these capabilities into three essential preconditions for EA function efficiency: (1) a clear and accepted EA function definition, (2) a transparently and consistently operating EA governance model, and (3) proactive collaboration and communication between all functions, bodies, and roles that take part in the EA function.

Appendix C: Semi-Structured Interview Guide

Topic	Guiding question
EA definition and EAM goal	**What is EA in your organization?**
	What is the scope of EA? What are the main components of your organization that you as the enterprise architect have control over their design?
	What is the mission of EA function in your organization?
	When and why did you develop an EA function in your organization?
	What have been the outcomes of establishing the EA function? What if there was no EA function?
	How EAM has evolved in your organization?
EA function structure and responsibilities	**How the EA function is structured in your organization?**
	Where exactly in the organizational structure the EA function is located? Why? What is the implication?
	What is the structure of EA function? Which architecture roles does it comprise? What are the implications of having this set of architects?
	What are the responsibilities of the EA function and each EA role? What are the key tasks of the EA function? What are the main products of the EA function? What are the main services that the EA function provides?
	What are the required inputs for accomplishing the EAM responsibilities and tasks?
	Who are the most important stakeholders of the EA function? Who are the most important customers of its services?
	What are the professional competencies of your architects?
	What are the challenges with the current EA structure: organizational position, organizational makeup?
	What are the ideal organizational position and makeup of the EA function? Why?
EAM application	**How are the enterprise architects involved in managing business architecture design and evolution?**
	How do the enterprise architects support developing the business strategy? (i.e., analyzing internal and external business context; redefining the business model; developing and evaluating various strategic options; selecting and specifying strategic initiatives).
	How do the enterprise architects support planning the business strategy? (i.e., operationalizing the business strategic initiatives into business capabilities and their components, i.e. business processes, organizational structure; defining and scoping projects realizing business strategy; managing the project portfolio)?
	How do the enterprise architects support business projects during implementation? (i.e., project solution architecture design; project reviews)
	Who are the stakeholders of the EA function for these processes?
	What are the enterprise architects' exact contributions to these processes? What if they were not involved?
	What are the governance mechanisms that ensure your contribution to these processes?
	How are the enterprise architects involved in managing IT architecture design and evolution?
	How do the enterprise architects support developing the IT strategy? (i.e., analyzing internal and external IT contexts; developing and evaluating various strategic options; selecting and specifying IT strategic initiatives).
	How do the enterprise architects support planning the IT strategy? (i.e., operationalizing the business and IT strategic initiatives into IT target architecture and roadmap; defining and scoping projects; managing the IT project portfolio)?
	How do the enterprise architects support IT projects during implementation? (i.e., project solution architecture design; project reviews)
	Who are the stakeholders of the EA function for these processes?
	What are the enterprise architects' exact contributions to these processes? What if they were not involved?
	What are the governance mechanisms that ensure your contribution to these processes?
Challenges	**What are the challenges the EA function is facing managing the design of IT or business architecture?**
	What are the challenges in EA function support for business or IT strategy formation, planning, and implementation processes? Why?
	Why don't you have an EAM wider in scope, wider in applications?
	What other processes/decision makings could the EA function support but is not supporting currently? Why?
	What is the plan for extending the EA function and EAM capability in your organization? Why?

Appendix D: Codebook Used for Case Data Analysis

First-order code	Definition	Inclusion/exclusion criteria	Second-order code	Definition
EA scope	Breadth of EA function responsibilities covering the design of IT components, business capability elements, business strategy, or a combination of the three.	The excerpts may not appear only in answer to the question what EA scope covers. Sometimes the EA scope is better elaborated when the interviewee describes the processes EA function supports. Also include those excerpts that do not clearly enumerate the architectural elements EA support, but only give an indication of the EA function scope of activities. To distinguish enterprise from its environment, make a distinction between elements over which the EA function has design authority and elements affecting EA that enterprise architects need to have understanding of or at most influence their design.	Business strategic elements	Statements about EA function design authority over business motivation and business model elements such as mission, vision, goals, strategy, value proposition, value chain configuration, products, customers, and suppliers.
			Business capability realization elements	Statements about EA function design authority over elements realizing business capabilities such as organizational structure, business processes, people, and culture.
			IT elements	Statements about EA function design authority over IT elements such as applications, infrastructure, and data.
			EA environment	Statements about the elements outside the EA scope that the EA function needs to have understanding of, or may influence their design, but has no formal authority for guiding their design. Make a distinction between environmental elements EA function needs to understand and those that it may influence.
EAM goal	Mission of EA function, why EA function exists, or why EAM capability was established.	The excerpt may not always be the answer to the question regarding the EA function mission. Sometimes the interviewee may indirectly specify why they established EAM capability and what EAM has accomplished in their respective organization. Make a distinction between the goal of establishing EA function and the processes it supports. The goal specifies the ultimate objective of establishing EAM capability.	-	-
EA function position	Position of the EA function within the organizational governance structure.	If available, specify the exact position of EA function within the business or IT governance structure.	Located on the IT side	Statements about the EA function inclusion within the IT governance structure, e.g., IT plan, IT build.
			Distributed between business and IT	Statements indicating that the EA function is distributed between business and IT organizations.
EA function makeup	Roles included in the EA function.	Do not code excerpts that describe EA stakeholders external to the EA team. The excerpt should only cover those responsible for EAM tasks and deliverables.	Business and IT architects	Statements that imply that the EA function includes both business and IT architects. Enumerate the roles and skill sets if available.
			IT architects	Statements that imply that the EA function includes only IT architects. Enumerate the roles and skill sets if available.

Appendix D: Codebook Used for Case Data Analysis (Continued)

First-order code	Definition	Inclusion/exclusion criteria	Second-order code	Definition
EAM application	Organizational processes and functions that EAM facilitates and supports.	The excerpt should refer to organizational processes or functions that EAM supports. Do not code excerpts that specify a process within the EAM capability. To provide a better picture, also include those excerpts that indicate that the EA function does not support a specific process. Make a distinction between those processes in which enterprise architects are formally involved and those processes that EA function does not formally support, but may influence.	Business strategy formation	Statements about architects' involvement in evaluating and elaborating internal weaknesses and strength and external threats and opportunities and developing and selecting business strategic options. The statement may also explain architects involvement in developing the business model. It also covers statements concerning enterprise architects formal involvement in devising initiatives to address business architectural issues.
			Business strategy planning	Statements about architects' involvement in translating the business strategy into tactical plans in terms of business capabilities and elements realizing those business capabilities. The statement may also explain the EA function involvement in developing the target architecture and roadmap for business capability elements. The statement may also indicate enterprise architects involvement in defining and scoping projects that realize the business strategy and also planning and prioritization of those projects.
			Business strategy implementation	Statements about architects' involvement in business project implementation. This may include architects support for project reviews prior to, during, and after project implementation, or their involvement in designing the solution architecture.
			IT strategy formation	Statements about architects involvement in evaluating existing IT architecture and emerging IT trends for developing and selecting IT strategic initiatives. The statement may also cover architects' involvement in devising initiatives to improve IT architecture.
			IT strategy planning	Statements about architects' involvement in translating the business and IT strategy into IT tactical plans. This includes activities related to developing the target architecture and roadmap for IT applications, infrastructure, and data. It also covers the EA function support for defining, scoping, planning, and prioritizing IT projects.
			IT strategy implementation	Statements about architects' involvement in IT project implementations. This may include architects support for IT project reviews prior to, during, and after project implementation, or their involvement in designing the solution architecture.
			Influenced processes	Statements about architects' support for processes outside their EA scope and responsibilities. The statement indicates architects' influence and not formal responsibility for supporting those processes.

Appendix D: Codebook Used for Case Data Analysis (Continued)

First-order code	Definition	Inclusion/exclusion criteria	Second-order code	Definition
EA function tasks	Tasks and deliverables of the EA function.	Code those excerpts that describe how the EA function support the processes it is incorporated into.	Supporting EA decision making	Statements regarding EA function tasks for supporting EA decision making. Pay attention to the methods the EA function uses to facilitate decision making. This may include providing a holistic understanding of EA through EA modeling. It may also include EA analysis.
			Assessing architecture compliance	Statements regarding EA function tasks for ensuring consistent EA changes. Pay attention to the methods the EA function uses for assessing architecture compliance. This may include EA analysis that assess whether a change is in accordance with EA target architecture, roadmap, and policies. It may also include developing EA policies.
EA function stakeholders	Stakeholders of the EA function, those that use the EA function services, and those who are influenced by the EA function activities.	The excerpt may not always be the answer to the question who the stakeholders and customers of the EA function are. Sometime the stakeholders are indirectly mentioned when elaborating on EAM applications and EA function involvement in various processes.	-	-
Transition	Evolution of the EA function in the organization and extensions in its responsibilities and coverage of various processes.	Pay attention to the reasons for the transition. It also covers statements about the desire or plan for extending the EA function.	-	-
Challenges	Challenges the EA function faces supporting EA design and evolution.	Pay attention to the root causes of the challenges, especially in relation to EA scope and EA function position.	-	-

Appendix E: Quotations from Cases - Alpha

Concept	Property	Representative Quotation
EA scope	EA function covers applications and infrastructure EA function has no business decision power	[Sitting in] IT the only thing you are entitled to is to try to get ownership of your services which at the very least is your application portfolio and your basic technology services and that is where we come from. We don't have any decision power with respect to which business activities the line of business wants to pursue.
	EA function located on the IT side	We are a staff function to the CIO so we report to the CIO.
IT strategy formation	EA function responsible for IT strategy process	The first deliverable out of my EA function is IT strategy.
	EA function responsible for developing IT strategy based on emerging IT trends	And then we do other parts that we impact and say then aside from what the business has already made of sense, then introducing new technology, new information architecture something we could improve what business could do.
	EA function suggests areas for standardization	I need to be ready to talk to the CFO of the finance board and tell where we should focus more on standards, a particular geographical area, or within one business capability, where we think the synergy is the best.
IT strategy planning	EA function facilitates establishing target IT architecture	We are facilitating the establishment of target architecture and we are reviewing them with business and we are accountable to make them fit across.
	EA function assesses project idea and input for their prioritization	We are consulted in the project approval going into the portfolio. I am influencing project portfolio management with suggestions with the prioritization of projects.
	Integrated business and IT planning	I spend equal amount of time in considering how our business should look for optimizing the usage of our IT solution as I do in designing IT solutions. I spend equal amount of time in understanding and talking to people making business plans as I do in talking to people that make IT roadmaps. So I try to be on both sides.
IT strategy implementation	EA function ensures IT project execution in alignment with strategy	One first thing it is trying to connect activities that happen day to day to the strategic objectives because the difficult part of strategy is execution not defining strategy.
	EA function accountable for project architecture compliance checks	Enterprise architect will be accountable at various project feasibility stages or gates that all active projects within are passing through.
Understanding of environment	EA function needs to understand business context	Insist on understanding the business until you actually can be confident and can do that. Understand your business operating model, understand the governance of your business, understand the history, the organizational structure, everything that relates to your business operating model and then it is about understand your strategy.
	IT choices needs to be justified based on business requirements	I need to be able to justify my choice of platform with the business needs and requirements not just from an IT technical perspective.
Influence on environment	EA function facilitates business standardization	Me as the EA I'm facilitating business harmonization. I show the business the places they are not working the same way, but it is the business who should decide in how many ways we want to run this process.
	EA function consulted for business improvement initiatives	Any of the business initiatives that we are looking at, I am consulted. So any work on what we want to improve in our sales processes I am consulted. Any work on which part of our support function we should improve my team is consulted. We are consulted so we are included in the planning.
Transition	EA function located on business side would have higher mandate for business design	A limitation I could see is that being fully an IT function limits our capability to have a deep discussion regarding the business strategy. [Moving to business side] then we would have more mandate to define standardize processes in some areas for example.

Appendix E: Quotations from Cases - Beta

Concept	Property	Representative Quotation
EA scope	IT architecture function covers technology and infrastructure Business architecture function focused on business processes, information, and functions	We are business architecture function. We have a sister IT department also enterprise architecture but they have more technology and infrastructure and security so we have this angle that we have the business. We [business architects] have the processes, we have information model and we have component models where we tell where there are business functionalities.
	Business and IT architecture functions located on business and IT sides	I [business architect] am placed in the business area in area called new business solutions. IT architects they are sitting in IT.
	Business architecture function responsible for design of business processes, information assets, and IT services	Business architect owns the process during the project and when the project goes into operation business unit will own it. [We have] the processes, we have information model and we have component models where we tell where there are business functionalities.
Business strategy formation	Business architecture function not involved in business strategy formation	I am not as involved [in business strategy development] as I would like to be. We have four strategic goals and that is fine with me.
Business strategy planning	Business architecture function not involved in project definition or project portfolio management	We [business architects] have no role in defining business projects. We wish for more engagement in business portfolio management.
Business strategy implementation	Business architecture function highly involved in defining business solution architecture	[Our mission] is to be sure that the [IT] solutions we buy or build correspond to what we want in the business. [During the projects] the business architect makes the business architecture solution.
	Business architecture function ensures consistent design of business project solution architecture	Enterprise business architects align business requirements and business solutions across all projects.
Understanding of environment	Business strategy only input to business architecture design	I am not as involved [in defining business strategy] as I would like to be. Business strategic objectives are the frame that we are working inside. So we must relate to them. The architecture strategy is linked to business strategy.
Transition	Business architecture function moved to business side to better understand business	I have been on the IT side and I was not able to understand, I was not close enough to the business. They want us to be closer to the business to understand the business needs, customers, and stakeholders. Because you as an enterprise architect are there for the business and you should understand the business very closely, you should be close to the business to find out what problems they have and you cannot find those out just by meetings and sitting there. You must be there.
Collaboration between business and IT architecture functions	Business and IT architecture functions collaborate on project solution architecture assessment	We [business and IT architects] have a lot of things together for instance which kind of architecture principles we should have, which kind of reviews we should make to projects, things like that.
	Business and IT architecture functions collaborate on project solution architecture design	They are also part of the projects. There is a business architect and an IT architect in a project. The business architect is making the business solution how do we see this from business perspective and IT architect is working together with the vendor finding out the technology and applications.

Appendix E: Quotations from Cases - Gamma

Concept	Property	Representative Quotation
EA scope	EA function covers applications and technology	We have come to realize this that this is function required mainly to protect IT. So the level of maturity in EA is quite low and our function exist to keep track of our landscape and its visibility making sure we have proper decommissioning plans in place so whenever we introduce a new component within the landscape that we make sure whatever it replaces is phased out so that kind of tactical decisions. We simply want as few application and technology components as possible.
	EA function located on IT side	At the moment we are a part of IT development function.
IT strategy formation	No IT strategy	One thing is important to know that we deliberately do not talk about strategy in our business. And this is quite important and quite rare. And in fact it is a word that is forbidden. We deliberately don't know where to go in five years.
IT strategy planning	EA function plans IT landscape rationalization	Within our documentation framework we can classify each component as being if it stays on, planned for sun setting and that goes also for integration points. Level of support can also vary depending if it is a part of our core business or surrounding inferior technology. So we say this application was built for someone who is not here anymore so let's kill it. So mainly out of IT rationalization point of view.
	No IT planning based on business strategy	In our pipeline of evolving architecture team we also want to do road mapping for our business. At the moment our project pipeline is highly reactive and very tactical oriented. We don't really have a high level plan in which we engage in our projects and we prioritize our projects
	EA function very late involved in planning business-driven IT projects	Sometimes the business approach us with something which is already very matured so they already have discussions with the solution vendor so this still happens in many cases so we are coming in very late. It is a very steep curve to ramp up the discussions when you are into the discussion this late and certain thing might have already carved into stone.
	EA function assesses architectural compliance of project ideas and their impact	So provide input on the business and IT impact of a project and we give input of this project is IT principle complied, if it is not how do we see way back if we do a non-complied project. We are brought in reviewing what we call one pager. So we make a forecast saying this project will introduce another 10 integration point and three components just go back to our librarian function.
IT strategy implementation	EA function accountable for project architecture compliance checks	We also do project health check and this is one of the reasons we are placed in build because we need to be very close to projects.
	EA function highly involved in designing solution architecture	I have 5 people in my team and at least 2 of them are very much engaged in solution architecture work. But this is a part of our maturity journey.
Understanding of environment	Business understanding essential for managing IT architecture	We have a certain level of maturity where the topics are mostly within technology domain but understanding business is a big part of our daily life and we truly believe that integrating business people into IT organization will make a big difference in our alignment journey.
	EAM activities not in line with business	Our EA activities it is sort of out of context with business and that is why I call it tactical.
Transition	EA function becoming more involved in IT strategic discussions	This has matured and emerging in our case to a more strategic level, so not only discussing IT with only end users or functional management to more discussing IT with senior business managers. So IT discussions are slowly moving up to higher levels of organization.
	EA function will be relocated as staff function to CIO	For the level of maturity we have right now [we are at the right place in IT development] but of course we are discussing we eventually should be a consulting function of CIO.

Appendix E: Quotations from Cases - Delta

Concept	Property	Representative Quotation
EA scope	EA function only covers IT EA function structures application and technology landscape	I am not in charge of Enterprise Architecture, but in charge of Enterprise IT architecture. I would say our main mission is to add structure and to secure that we do IT in a structured way. We are trying to get out of the hair ball of applications architecture. We have also worked on technology landscape to simplify that as well.
	EA function located in IT	If we divide IT into plan, build, run, we are sitting in IT plan.
IT strategy formation	EA function support IT strategy development by providing internal and external views	We have been heavily involved in the IT strategy path. At the architecture community we come up with some deeper technical knowledge of what is possible, what is available in the market, what can be done as new things.
IT strategy planning	EA function plans IT rationalization	We are trying to get out of the hair ball architecture that we have right now where there are a lot of systems doing the same, not necessarily have an overview of what we have of applications. So coming from this hairball architecture where there is a huge complexity to something that is less complex and more modular.
	EA function plans IT based on business requirements	Enterprise architects draft the roadmap. They define the target architecture. But they write at least portions of the document in dialogue with the business.
	EA function assesses project ideas against roadmap and support their sequencing	Each and every IT project and in fact each and every service request we are dealing with are being assessed architecture-wise, securing whether this specific project is supporting our roadmap, does it bring us in the right direction. And we help with understanding the technical dependencies between projects as well as the process dependencies between the projects as well as understanding which one is the right sequence of the projects.
	Integrated business and IT planning	[We are doing] capability-driven architecture meaning putting customer relationship management in the front and then find out afterwards how to serve the customer and then talk about with which application are we supporting that flow.
IT strategy implementation	EA function responsible for project architecture compliance checks	We have processes for running projects that requires architecture assessment is done. We are following up on all these projects that we are running so we should be in control of what is happening.
Understanding of environment	EA function needs business understanding to add value	I think it is important to be up to date with what is happening in the business. Where we can make a difference is where we also have some business knowledge because then we can compare what is possible IT-wise and what business needs, and that is where we can make a difference. If we are just IT solution provider then that can be bought anywhere.
Influence on environment	EA function has influence on business process design	Business strategy is not part of our scope. Business processes are also residing in business, half-half. We still have a say in some of it, we are at least involved, but they are still anchored in business. So sometimes we are part of the definition of the processes so we can influence that they do not invent something that is not fitting to IT at all.
	EA function advises business on improved use of IT	We have a great IT solution probably and they are not really using it, we go backwards and say you use this application now this way what about if you use it that way. This is your opportunity what you could do with it instead.
Transition	EA function moved to plan to plan IT architecture evolution	We moved EA from build to plan because of the need to talk about the target big picture and talk about the roadmap. This is something you do in plan and not in build.
	EA function gained more influence over business processes	We are starting to have influence [over business processes]. If we look back in time I would say no. Then it was highly separated what they decided and agreed on in the business and what we were involved in IT-wise.

Appendix E: Quotations from Cases - Zeta

Concept	Property	Representative Quotation
EA scope	EA function is IT-focused	We are involved in only those business initiatives with IT implications. The others we do not get involved in. There needs to be a flavor of IT for us to be involved.
	EA function located in IT	[We are located in] plan and somehow engaged in build.
IT strategy formation	EA function supports developing overall IT strategy and business units' IT strategy	We [enterprise architects] deliver IT strategy for the whole IT but we are also delivering a business unit IT strategy for various business areas. We are formulating business unit IT strategy, but we are doing it on business units' terms and conditions.
	EA function advises for innovative use of IT	We would like to think we are [vanguard architects]. We are targeting some innovative use of technology.
IT strategy planning	EA function translates and analyzes business requirements	We translate and challenge business requirements, make business models and predict the impact on the overall IT design and architecture.
	EA function plan IT rationalization	Then we have a number of IT direction target roadmap. Those are the initiatives that help IT in delivering better standardized services. And of course if through your analysis of business unit direction target roadmap you realize that these need to change there needs to be a new one you need to produce these offerings through a project, a plan of action.
	EA function plans IT based on business requirements and IT optimization	We define IT roadmaps based on business unit requirements and technology optimization.
	EA function involved in defining IT project idea	We write for the business projects the project idea, so we own the project idea of all the IT projects that are going to be delivered.
IT strategy implementation	EA function responsible for project architecture compliance reviews	And then we help in reviewing what has been produced in the end. We do the review usually when they enter the phase or leave the phase.
Understanding of environment	IT architecture development in alignment with business strategy	We would try to help with business mission and vision and strategies. We need to have these two extracted in order to align with it.
	IT project ideas defined in line with business strategy	We actually write the project ideas from strategic initiatives.
Influence on environment	EA function consults business for new and improve use of IT	EA function provides business consulting to business functions by outlining new or improved use of IT systems.
	EA function consults business for developing IT-enabled business capabilities	If this is what they want to do in order to achieve learning and market share and this is their expectation and issues and this is how we are going to solve it, you could have a piece that says by the way if you go on mobile and have another way of working with your customers you can have another take on your marketing and your customer loyalty. There we are feeding in a new understanding of how they lift their business area.

Appendix E: Quotations from Cases - Theta

Concept	Property	Representative Quotation
EA scope	EA function focused on IT	In our current way of working we are very focused on our global IT. We are mainly working with applications.
	EA function located in IT	And I am sitting in the design organization in IT.
IT strategy planning	EA function too late involved in planning IT-related business initiatives EA function reactive, recipient of IT change requests	I think right now the governance process is change request driven meaning that is when business has a need for change of some IT whereas if we had a board that talked about business initiatives or something and then there would be a flag to see if there is an IT flavor in this if that was it then business solution would be part of it from the beginning. Right now there are lots of business initiatives happening and then down the line they realize it involves IT and then IT is engaged. So IT becomes something you come to kind of late.
	No process to plan IT based on business strategy	Whatever strategy business comes up with we need to align our architecture based on that and what is that process? But right now it is us pursuing that information trying to put it down in architecture but it is not coming as a formal process that some strategies are changing and it goes to an enterprise architecture function where they analyze it and then you use it as a reference for the projects.
	EA function assesses IT change requests based on IT standards	So when we get these change requests we qualify them against some categories, so is it architecture complied, is it complied with our security, application governance, and so forth.
IT strategy implementation	EA function responsible for project architecture compliance reviews	When the project starts as a project we will have a reviewing role and approval role to see if they are complied with principles.
	EA function highly involved in designing project solution architecture	Very often I am discussing details with a group of people we call solution architects and I should be more focused on enterprise architecture. But the day to day problems are more about solution design so that is why we tend to go and assist and maybe taking lead on some solution design.
Understanding of environment	EA function without an understanding of business strategy	Right now we do not have a clear knowledge of strategic initiatives and efficiency programs and we are not part of it until some IT change requests come. We should be engaged immediately when there is an initiative.
	Business understanding essential for EAM activities	We have been doing some modeling to say this is how we believe we are working do you agree? Because nobody from business are putting words into this. And at the end of the day when you are doing architectures and solutions it is very fundamental to understand how business is interacting in the enterprise. That is the most important thing when you do architecture and if you do not have that right you cannot do architecture. That is where it starts.
Influence on environment	EA function with no influence on business decisions impacting IT	Right now what happens is that business may work for many month and suddenly they come and say we need this from you IT and then we get involved and we need to understand what has happened upstream and then there might be things that we might have recommended them differently because of our knowledge of the system.
Transition	EA function to plan IT architecture based on business strategy	We are trying to be a little more proactive, be prepared, so that is where we do our operating model and reach out to business. Is business saying something that requires changes in our architecture? And that is what we try to put at business architecture view and start giving some concepts and ideas of how the architecture could change.
	EA function to be earlier involved in planning business initiatives	We do see a lot of initiatives happening in business and we are trying to educate them that as early as possible the knock the door meaning start the change request before you have a need for an IT solution because then we as enterprise architect can take part also in discussing the business part. And then it evolves and as a part of this initiative there will be business change and business transformation and an IT component.

Appendix E: Quotations from Cases - Kappa

Concept	Property	Representative Quotation
EA scope	Business architects have design right for business processes, organizational governance, and IT services	[Business architects] have the design right for business processes, system solution requirements, roles and responsibilities.
	IT architects responsible for effective development of IT assets	I [IT architect] think the enterprise architecture in general is keeping track of [IT] assets. So we have what we call business platform and we make sure that the business platform is sustainable and can cope with all those changes and is ready for the strategic goals of the business now and in the future.
	Business and IT architecture functions respectively located on business and IT sides	IT architecture function is located in the IS organization in a subdivision called business design. Business architects are on the business side.
IT strategy formation	IT architects facilitate process for developing IT strategy	And then running the strategy process. The enterprise architecture is doing that. We will secure that we update our delivery area IT strategies and our IT strategy two times a year. The delivery areas are doing that [preparing their strategy] but we are facilitating it and we are having dialogues around it.
	IT architects contribute to IT strategy formation by introducing IT trends	We are also looking for trend that we can inspire the strategies with and we can make sure our business platform is capable of coping with those trends in the future.
IT strategy planning	IT architects translate IT strategy to target architecture and roadmap	I would again look at strategies and technologies and how we can bring those together and make sense of that. So laying down a lot of architectural proposals and roadmap and how we can implement that in five years plan.
	IT architects support defining IT projects based on business strategy	We see it as a sort of breaking down functionality and how to govern the requirements from business and how to balance that in a good way. How can we get the right projects, how can we do the right projects in order to fulfill the vision and the strategies of the business functions.
	IT architects define architecture outline of business and IT projects	Architecture outlines is what we [IT architects] do when we start the business and architecture projects. So this is a deliverable we do. it is a document that outlines what new services we will deliver and how they are architected.
IT strategy implementation	IT architects support architecture design of architecture projects	Mostly [IT architecture enhancement] projects are run in the delivery area and there will be a heading solution architect and then I will go and help and advice that solution architect.
	IT architects support architecture design of business-driven IT projects	I can also be involved in business [IT] projects because sometimes they do not follow the rule sets quite so there we can have architectural issues in the start of the project. Then we go in and guide and make clarity of the architecture
	IT architects assess project architecture compliance with principles	In the role of architect we look at the quality of the architecture work and if it is complied with our principles and overall architecture that will be main focus.

Appendix E: Quotations from Cases – Kappa (Continued)

Concept	Property	Representative Quotation
Business strategy planning	Business architects refine strategy into business plans and projects	We step in when the direction has been set and when it is time for becoming more specific on how to meet that direction. We cannot decide on the direction but to a large extent on how to meet that direction. When strategy is published we are some of those who can link strategic directions into reality or execution because we have this broad perspective across processes and across business units. We take strategic requirements and together with other business managers try to figure out how we can meet those requirements. And we define a project for that.
	Business architects involved in business project ideation and scoping	We either drive project scoping and ideation or are participants in project ideation.
	Business architects conduct impact analysis of business requirements	During creating project business architects have two tasks one is to refine and detail the requirements and to start doing some analysis into what is the actual situation that within that process area we are going to affect with that project.
	Business architects provides high level business project architecture	We refine the requirements to figure out how the solution would look like. We will provide a blueprint for a solution and that is a high level principles, processes and procedures to some detail and a first evaluation on what we need to do from system perspective.
	Business architects assess business project ideas against architecture principles	We evaluate it whether if it is efficient, if it takes too long time to execute compared to benefits, how it will impact the roles involved in executing the processes, verify against what kind of impact it could have on KPIs, and architectural principles like simplicity both from business and IT point of view. And if something violates IT architecture IT architects will tell us.
Business strategy implementation	Business architects responsible for project architecture compliance reviews	During execution we provide ideas on the solution and verifying and validating the solution as being refined, testing the solution, documentation of the solution, identifying who will this effect and if we need some training for them.
Understanding of environment	IT architecture developed in line with business strategy	Sometimes they [business relation managers] go through the business strategy with us and handover that to us. It is a very important input and it helps us to figure out what we should look for towards our vendors' roadmap.
	Business architects refine business strategy	We step in when the direction has been set and when it is time for becoming more specific on how to meet that direction.
Influence on environment	Business architects provide input to business strategy formation based on performance of architectural elements	Business initiatives may come from management or business areas, but it could also be the case that business architects themselves have identified some opportunities. We look at results could be KPIs and if we see gaps there it can be one input for we need to do something differently. We could also get inspired from outside to do something better or smarter.
	Business architects provide input to business strategy based on its impact on execution layer	We are kind of a link between execution and higher level on strategies. Strategies are made on a high aggregated level. We can give some input [to business strategy] from bottom-up. We provide input to process owners and they can choose to bring that to strategy sessions.
Collaboration between business and IT architecture functions	Business and IT architects involved early in planning business initiatives	We [business architects] are very good at involving IT early in the process [for planning business initiative] and it is an obligation for us to involve IT as early as needed.
	Tight collaboration between business and IT architects	There is a dialogue between us and our IT counterpart on what is a good system solution. Our business architects have good system knowledge and our IT architect have good understanding of business processes. We have overlap between IT and process organization and we can challenge each other.

Appendix E: Quotations from Cases - Sigma

Concept	Property	Representative Quotation
EA scope	EA function support IT architecture and market strategy development	We have two types of enterprise architects. We have foundational architects in Gartner's term that do classic business-IT alignment and we have two of those and then two of us we are doing market strategy development.
	Business architects cover business model	We [business architects] are operating based on business models like business model canvas.
	Business and IT architects located on business and IT sides	We [business architects] are located as the staff to the CEO. IT architects are under IT.
Business strategy formation	Business architects develop business model	We are operating business models like business model canvas. We define the business model and that is our understanding of business and we communicate based on that.
	Business architects question business model and trigger its change	We change the perspective and directors own ideas. We put ideas in their heads. That is what I call perspective, the perception directors have of what kind of a business it is. And we have to influence that so they are in right place to make right decisions. We can also give them the broader picture. We need to shape the map they have in their head.
Business strategy planning	Business architects support refinement of business model	We define the business model and that is our understanding of business and we communicate based on that. So we go for instance to a cooperation with PMO function about how the new project model should look like and it has to incorporate customers because they are the buyers, how we should get the requirements, how should the project should be in the company. We do a lot of incremental stuff that is a part of communication. It is not just about saying it to people but also about helping them do something.
	Business architects involved in business project ideation	It is in very early phases [of projects that we are involved], the ideation and the pipelining. Usually when it [project] goes further we step back and the solution architect takes over. The analysis phase is probably the last phase where we give input and then it goes to execution and then we are fully out of it. Business solution architects make sure that they have understood the concept and the customer. Business solution architect then keeps that focus throughout the project.
IT strategy planning	IT architects plan IT architecture in line with business requirements and IT rationalization	It is to professionalize what we have. For a number of years we have been producing lots of systems and to take that step and knowing what we have and how to use it the best way and how to renew the system portfolio but in a business perspective. IT architects they serve a very important function namely to clean up a lot of mess and they still need to do that.
Understanding of environment	Business model defined based on a market view	Also I would say that we look at outside the business. We look into the market and see what are the trends, what is potentially threatening and we start new initiatives that come from the left in this drawing. So we are thinking out of the box instead of what we have. We are asking what the customers want what do they expect, and also what we expect. In order to do disruptive innovation you need to get out of the box and look at both new markets and breakthrough innovations.
Influence on environment	Business architects foster innovative development by influencing environment	But in order to extend our survival ability we still need to still develop as a company and develop our capabilities doing something new and embracing rather than fearing all the changes in the market. And that is what we do. We try to extend the span of the company by understanding and seeing this and putting it into the pipeline. We have added competitive edges. And if we were not there all these innovative initiatives would have not been happening and we would have been another type of business.